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Colorado State Univ, Fort Collins Dept of Industrial Sciences

Prepared for

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Nov 77

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November 1977

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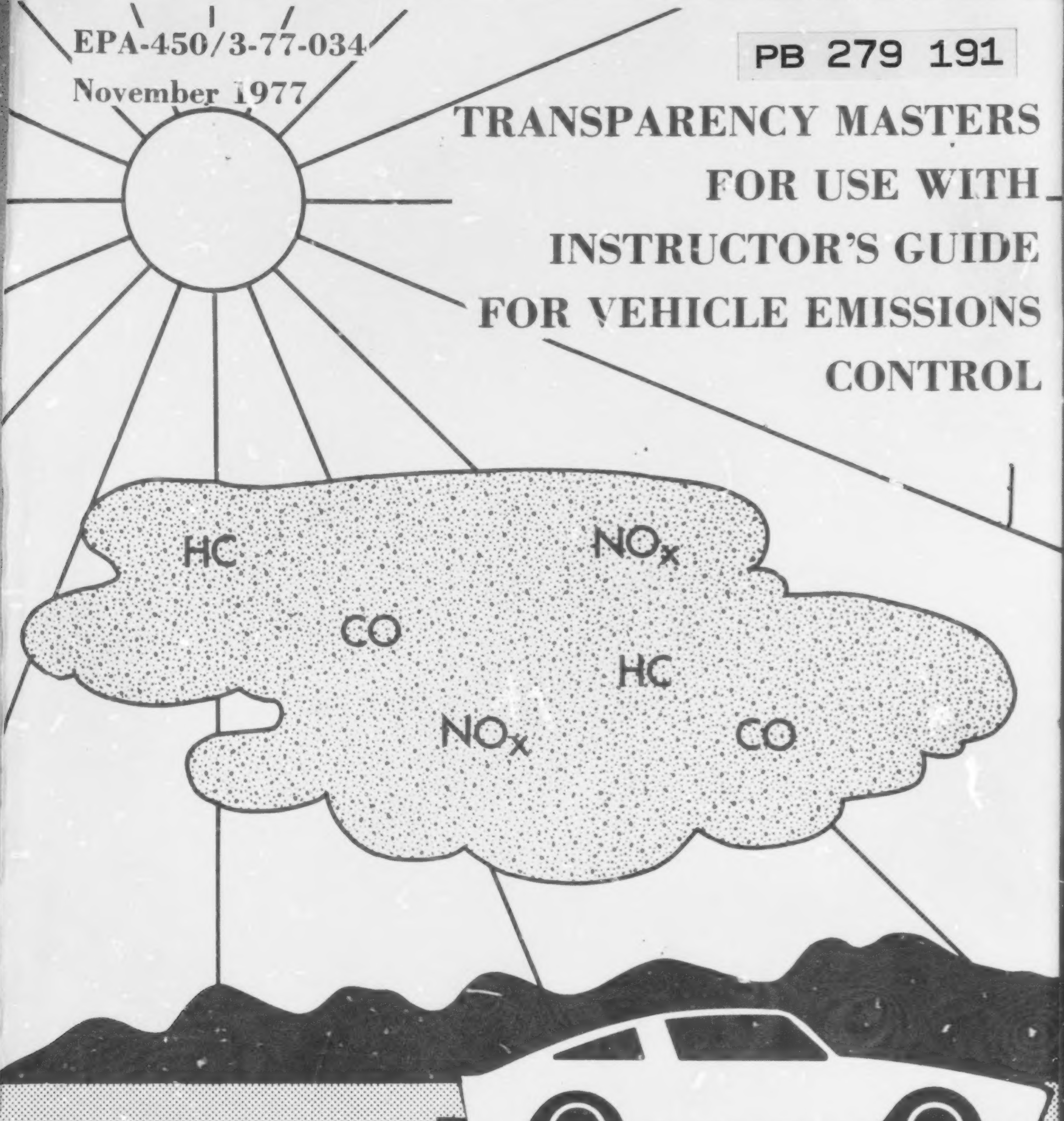
TRANSPARENCY MASTERS FOR USE WITH INSTRUCTOR'S GUIDE FOR VEHICLE EMISSIONS CONTROL



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by

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EPA Grant No. T900621-01-0

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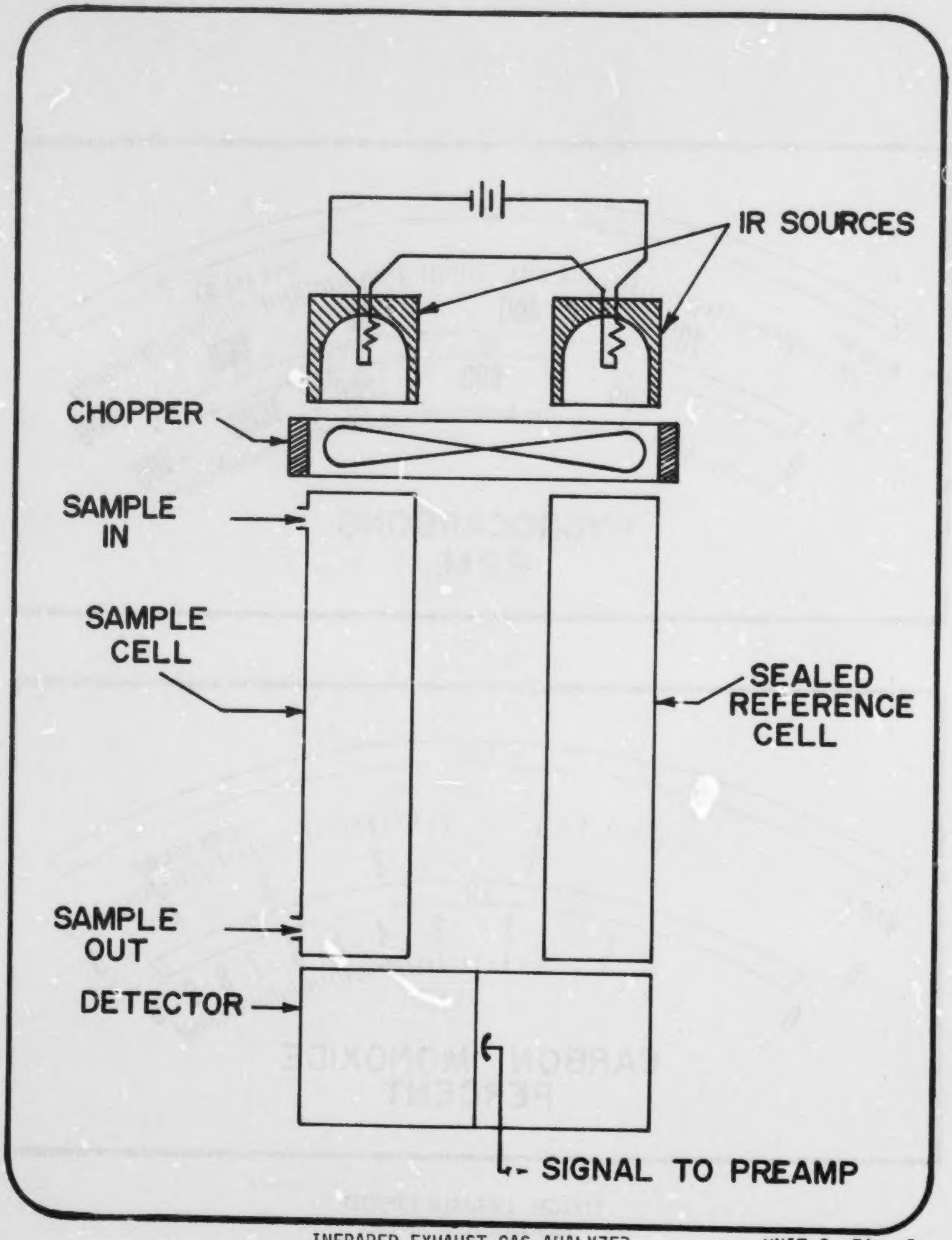
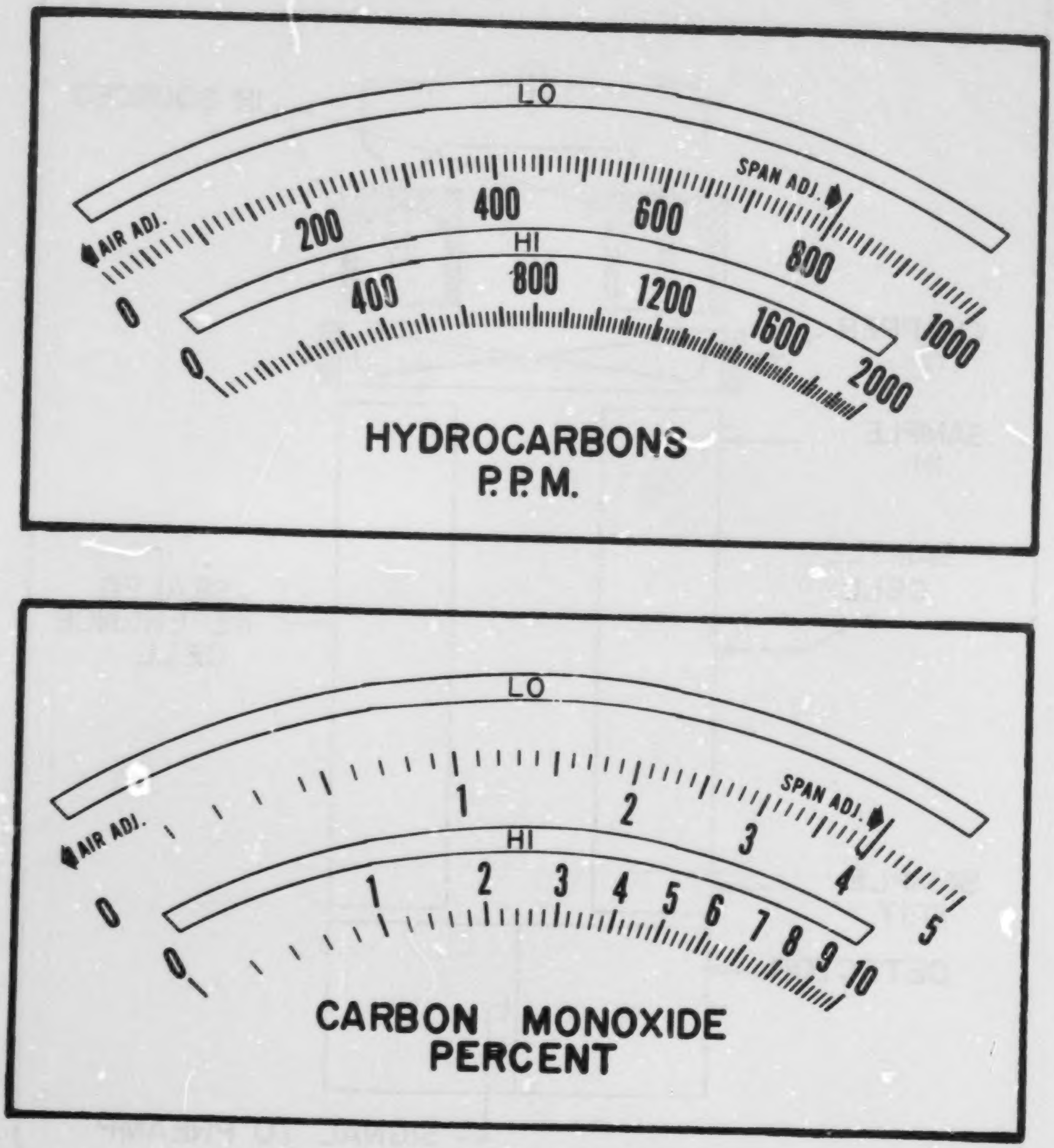
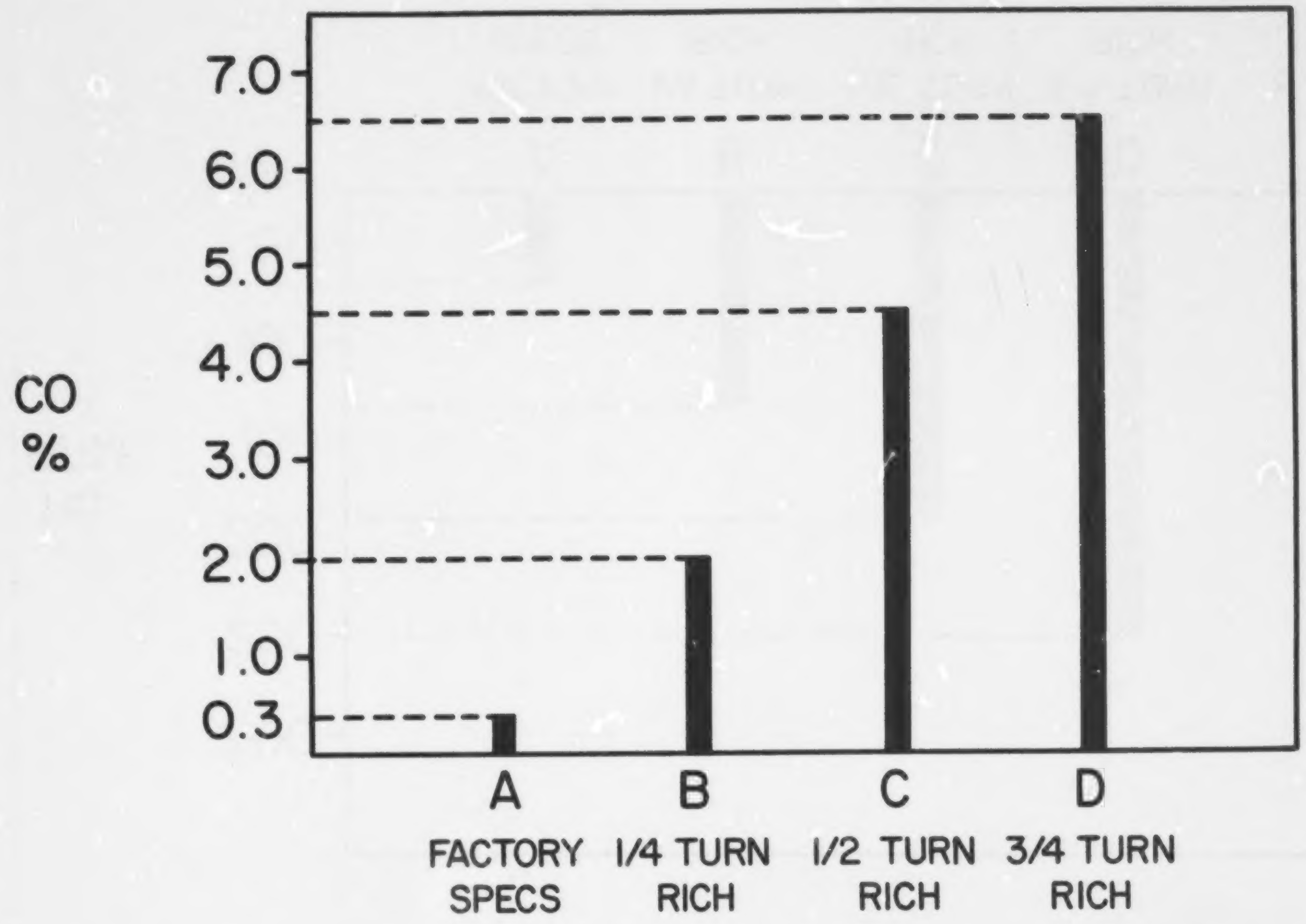

IR SOURCES
CHOPPER
SAMPLE IN
SAMPLE CELL
SEALED REFERENCE CELL
SAMPLE OUT
DETECTOR
SIGNAL TO PREAMP

INFRARED EXHAUST GAS ANALYZER

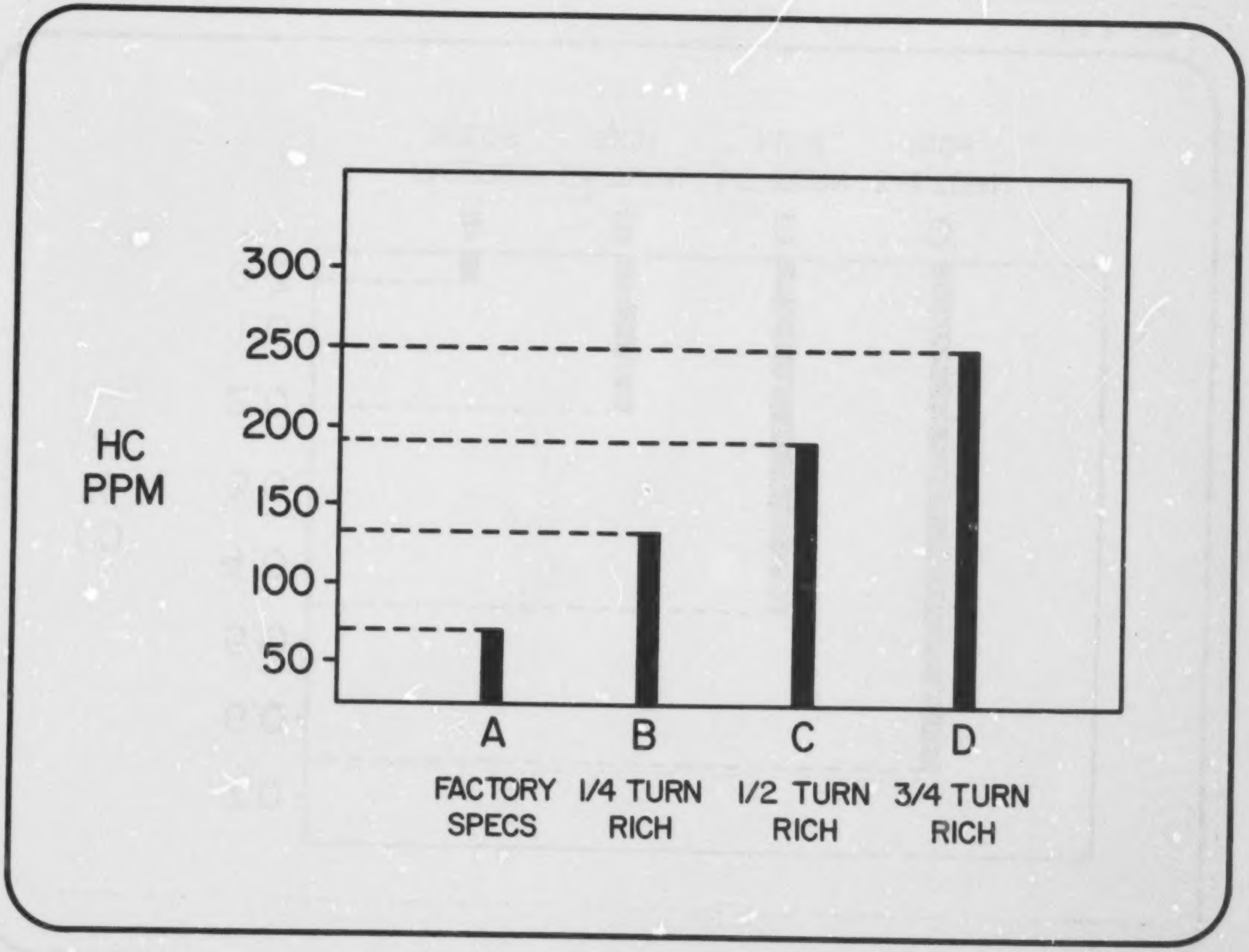
UNIT 2 - Fig. 1


LO
AIR ADJ.
SPAN ADJ.
0
200
400
600
800
1000
HI
0
400
800
1200
1600
2000
HYDROCARBONS
P.P.M.
LO
AIR ADJ.
SPAN ADJ.
0
1
2
3
4
5
HI
0
1
2
3
4
5
6
7
8
9
10
CARBON MONOXIDE
PERCENT

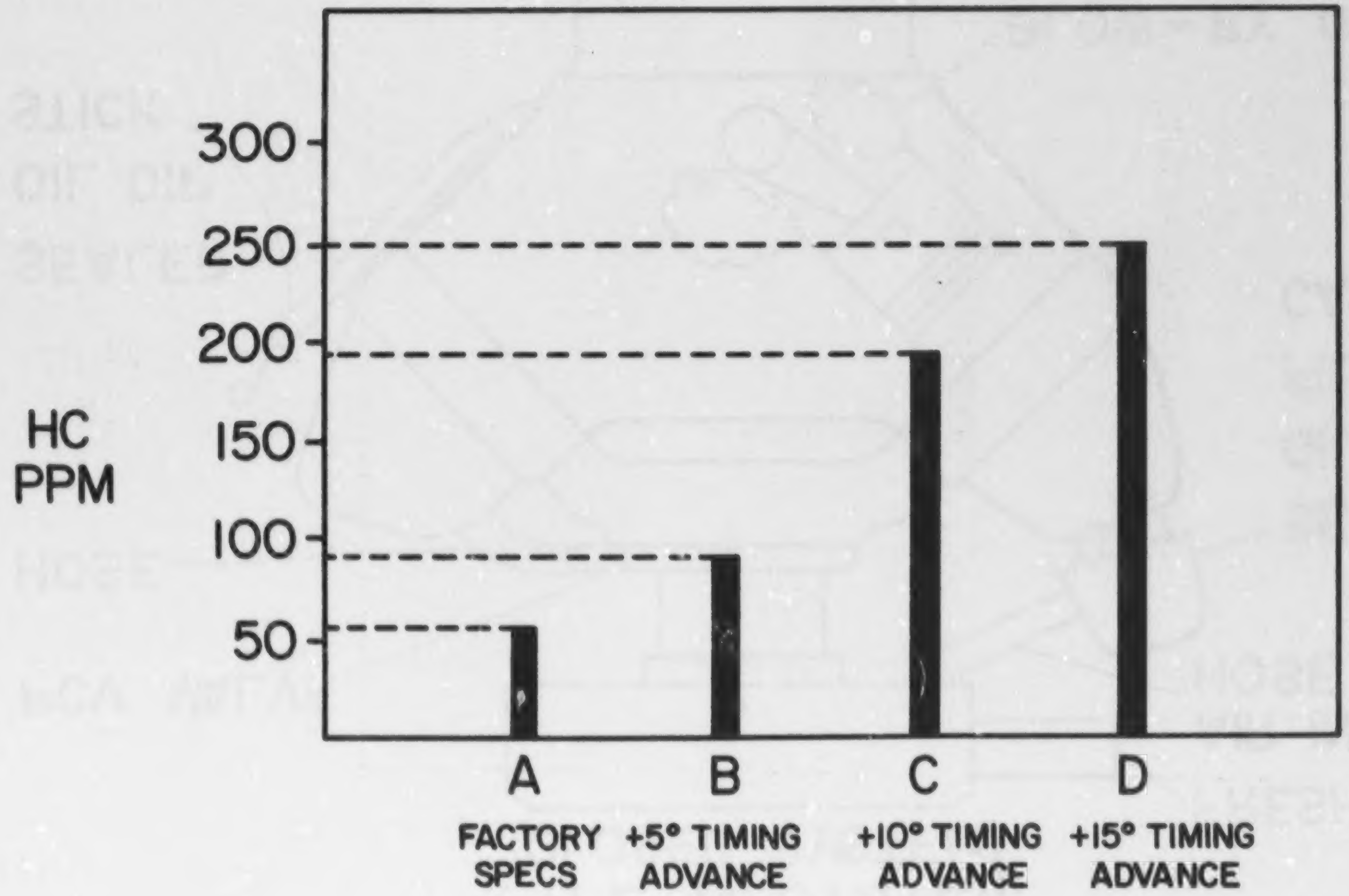
TYPICAL INFRARED EXHAUST
GAS ANALYZER METERS


CO
%
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.3
A
FACTORY SPECS
B
1/4 TURN RICH
C
1/2 TURN RICH
D
3/4 TURN RICH

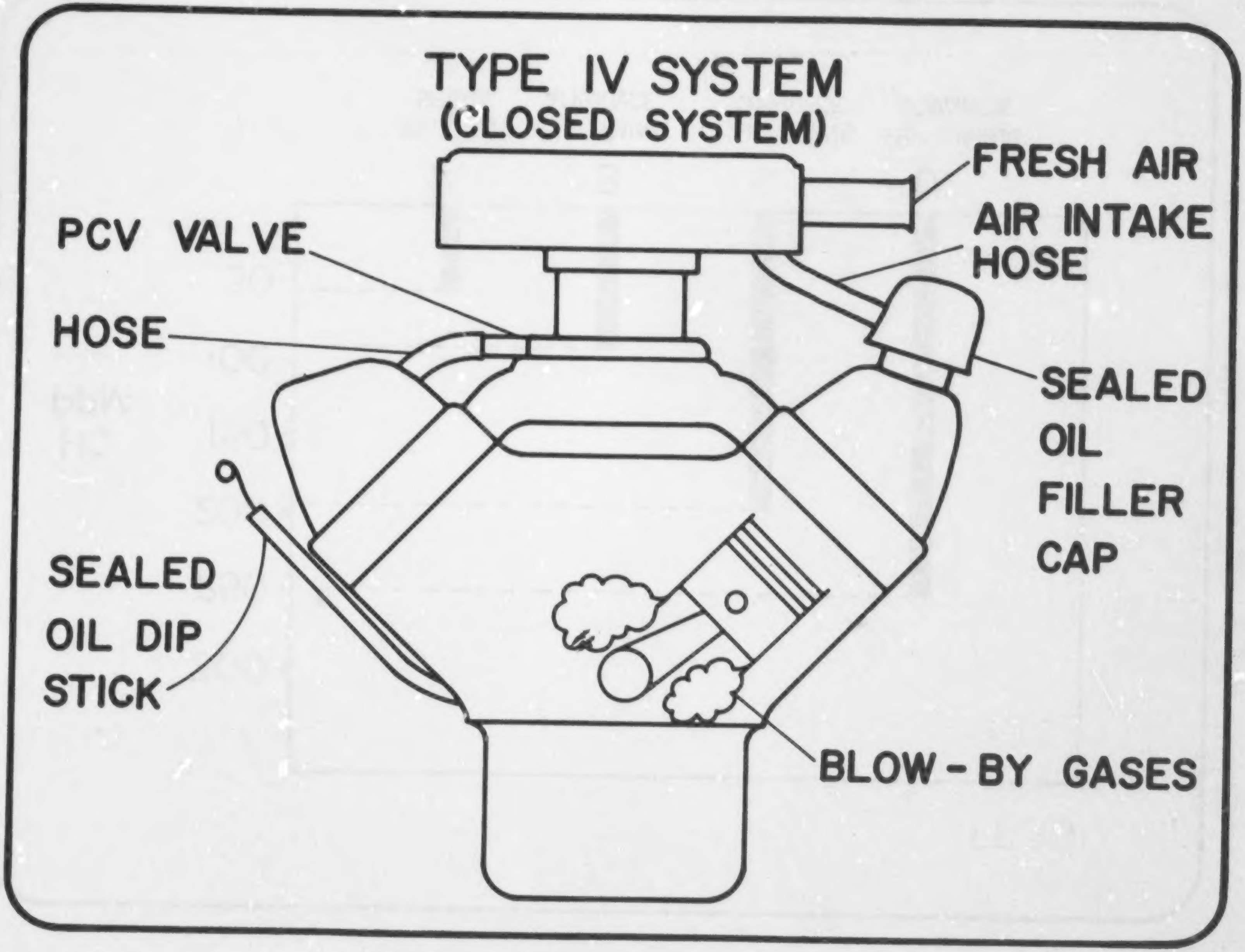
UNIT 3 - Fig. 1


HC
PPM
300
250
200
150
100
50
A
B
C
D
FACTORY SPECS
1/4 TURN RICH
1/2 TURN RICH
3/4 TURN RICH

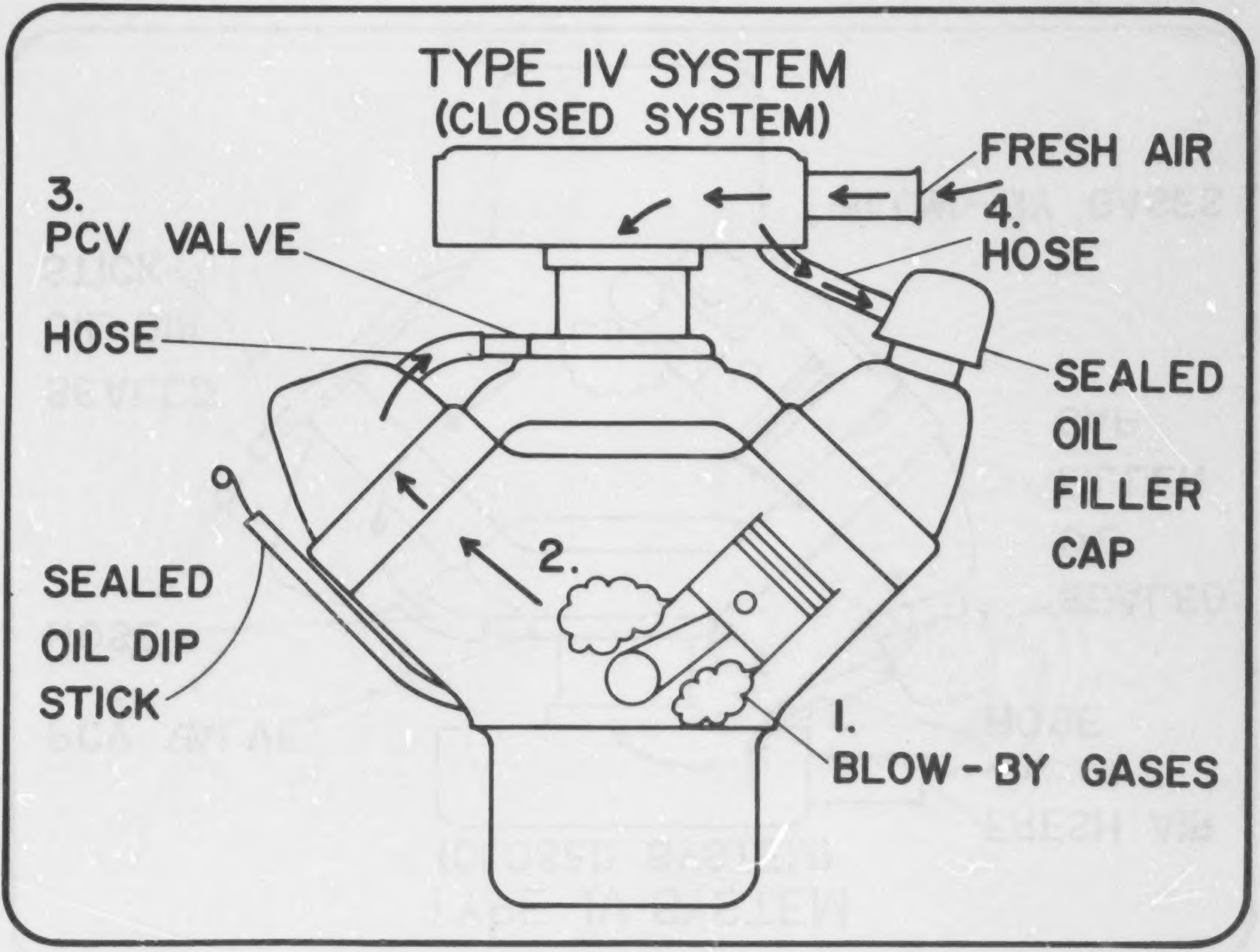
UNIT 3 - Fig. 2


HC
PPM
300
250
200
150
100
50
A
B
C
D
FACTORY SPECS
+5° TIMING ADVANCE
+10° TIMING ADVANCE
+15° TIMING ADVANCE

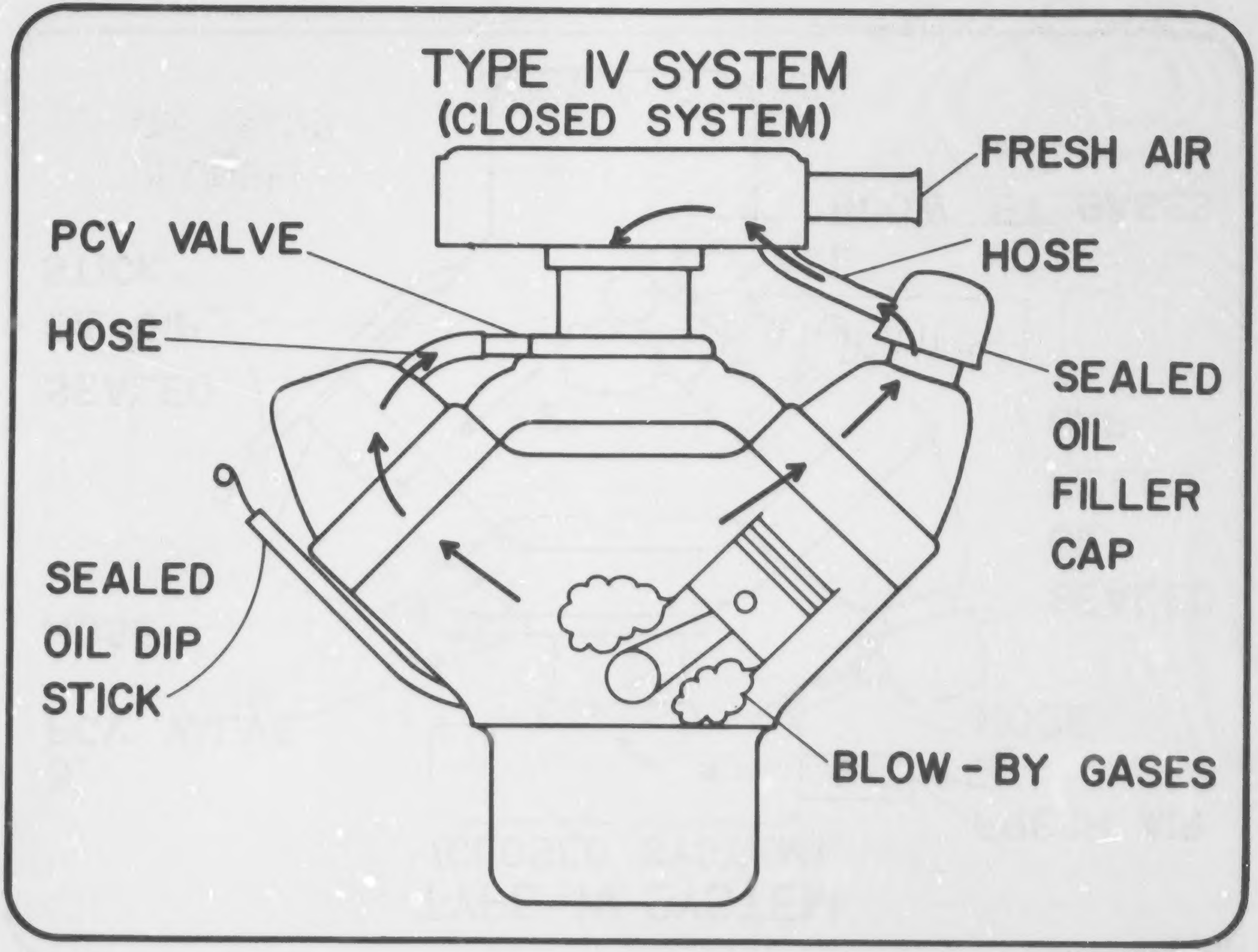
UNIT 3 - Fig. 3


TYPE IV SYSTEM
(CLOSED SYSTEM)
FRESH AIR
AIR INTAKE HOSE
PCV VALVE
HOSE
SEALED OIL FILLER CAP
SEALED OIL DIP STICK
BLOW-BY GASES

PCV. Fig. 1

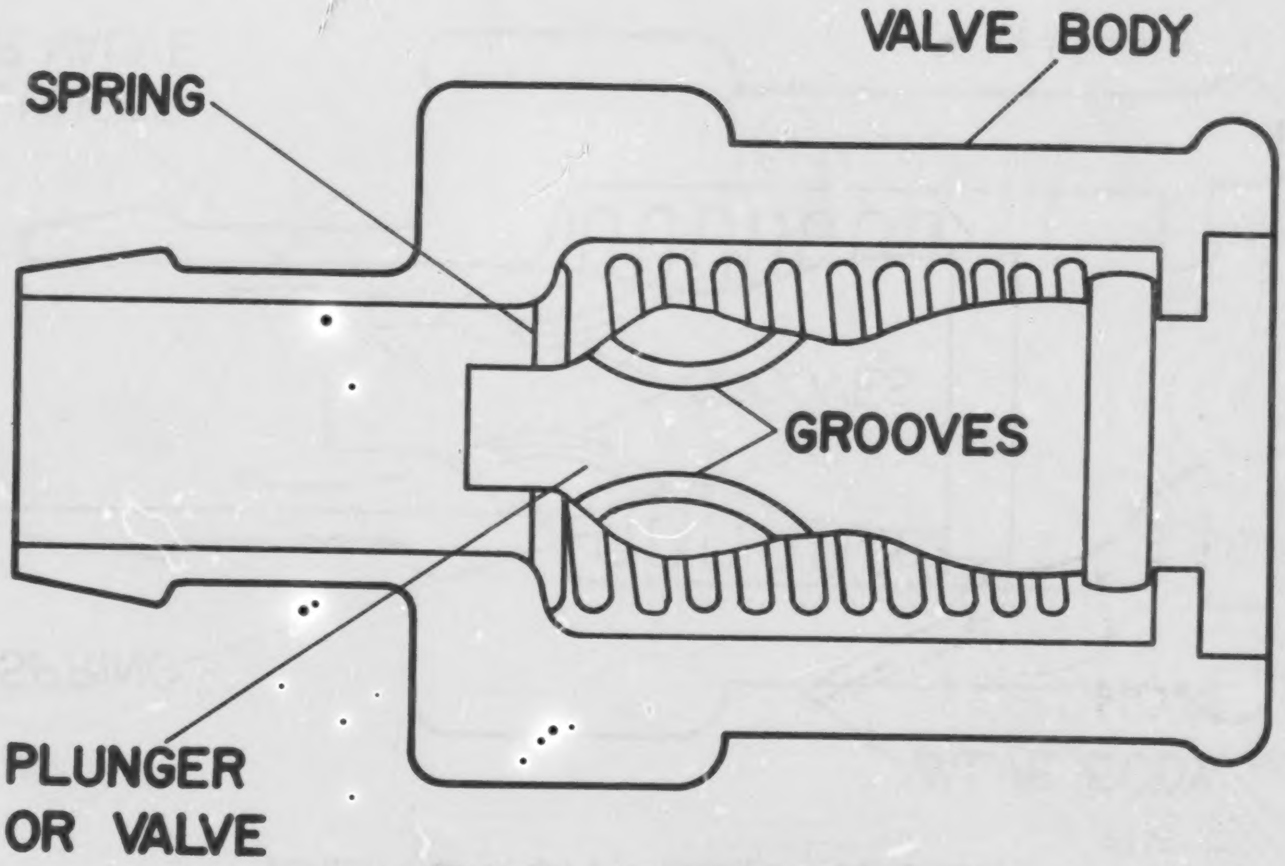

TYPE IV SYSTEM
(CLOSED SYSTEM)
FRESH AIR
3.
PCV VALVE
4.
HOSE
HOSE
SEALED
OIL
FILLER
CAP
2.
SEALED
OIL DIP
STICK
1.
BLOW - BY GASES

PCV. Fig. 2


TYPE IV SYSTEM
(CLOSED SYSTEM)
FRESH AIR
PCV VALVE
HOSE
HOSE
SEALED
OIL
FILLER
CAP
SEALED
OIL DIP
STICK
BLOW-BY GASES

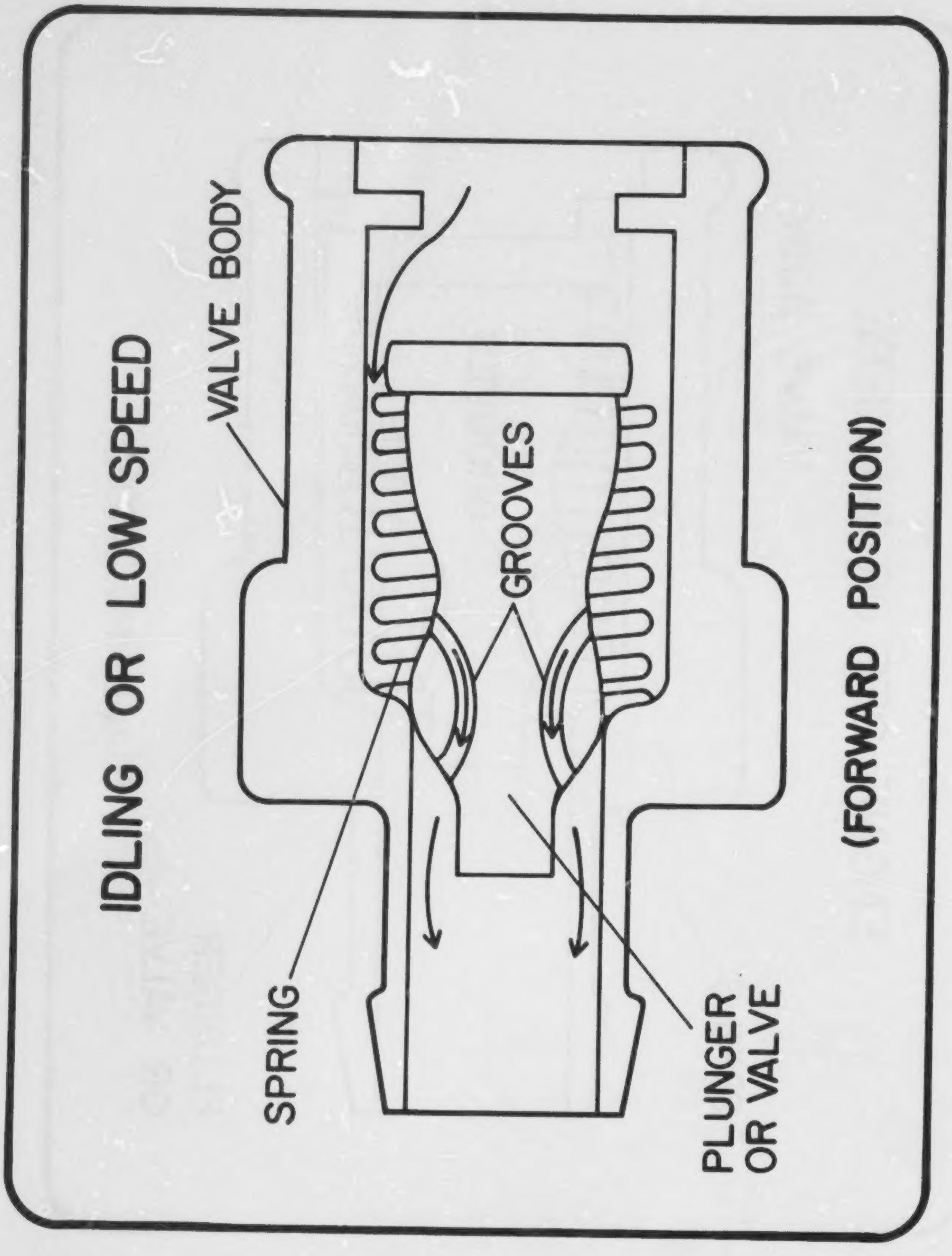
PCV. Fig. 3

ENGINE OFF OR BACKFIRE

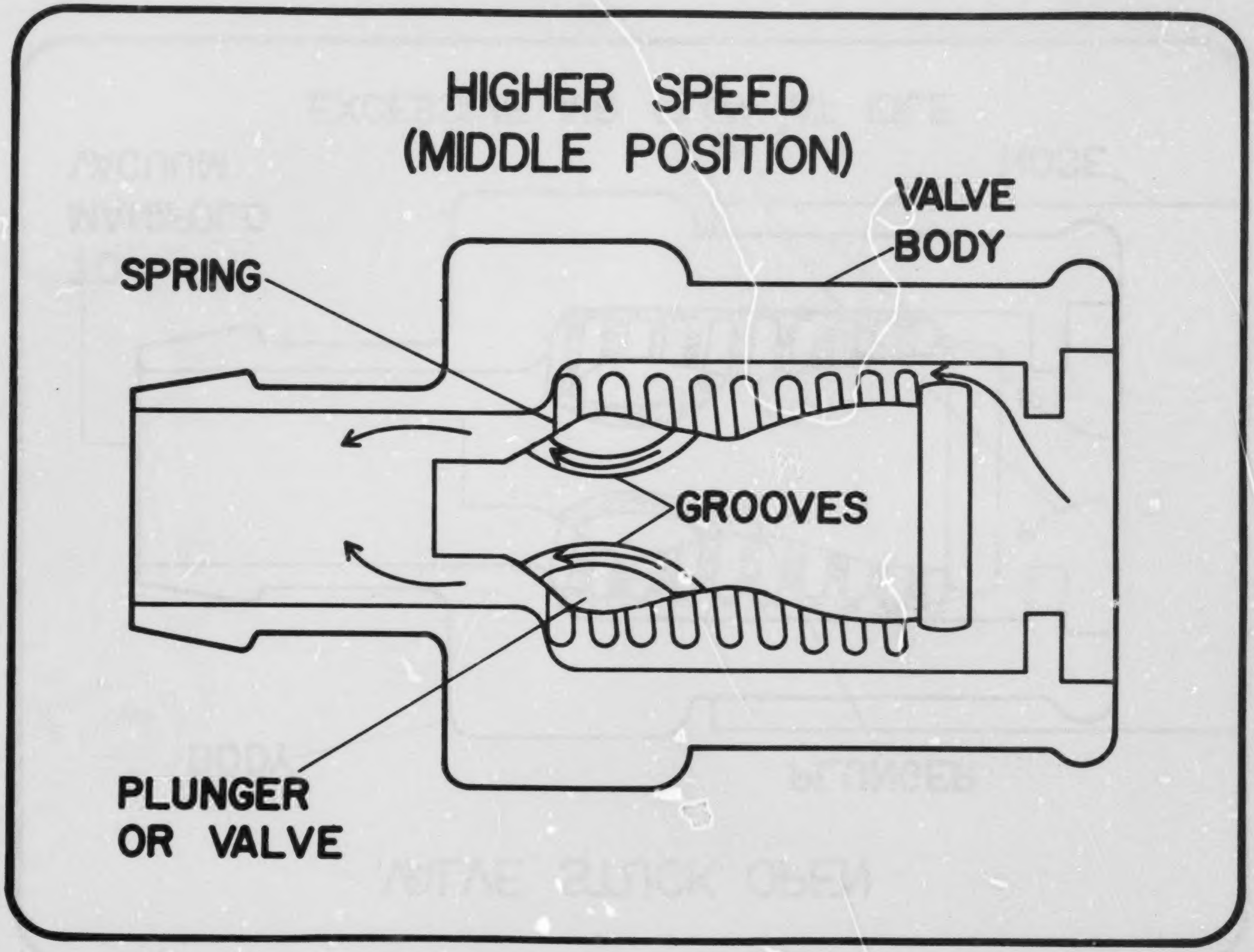

VALVE BODY
SPRING
GROOVES
PLUNGER
OR VALVE

(BACK POSITION)

PCV. Fig. 4

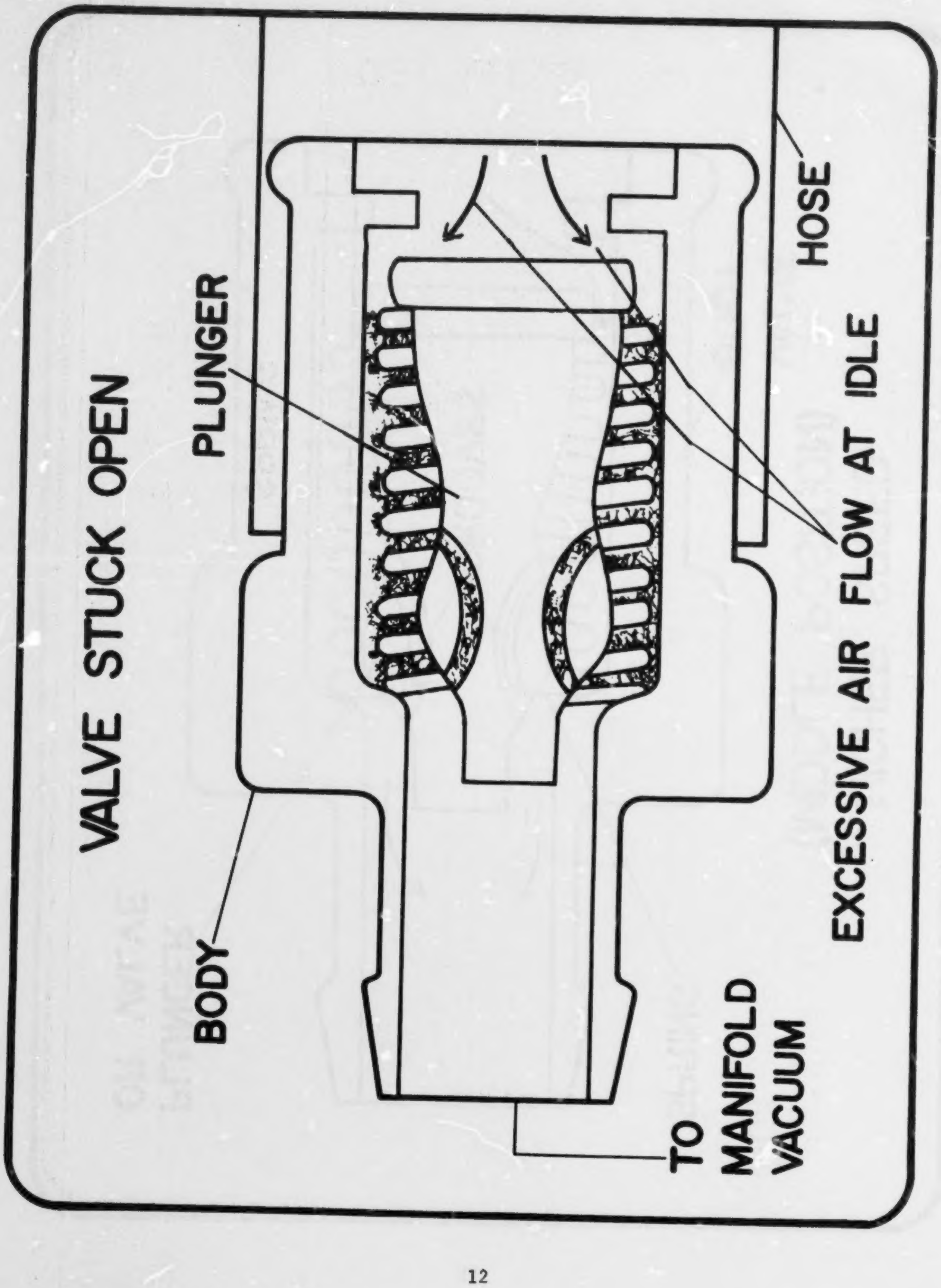

IDLING OR LOW SPEED
VALVE BODY
GROOVES
SPRING
PLUNGER OR VALVE
(FORWARD POSITION)

PCV. Fig. 5

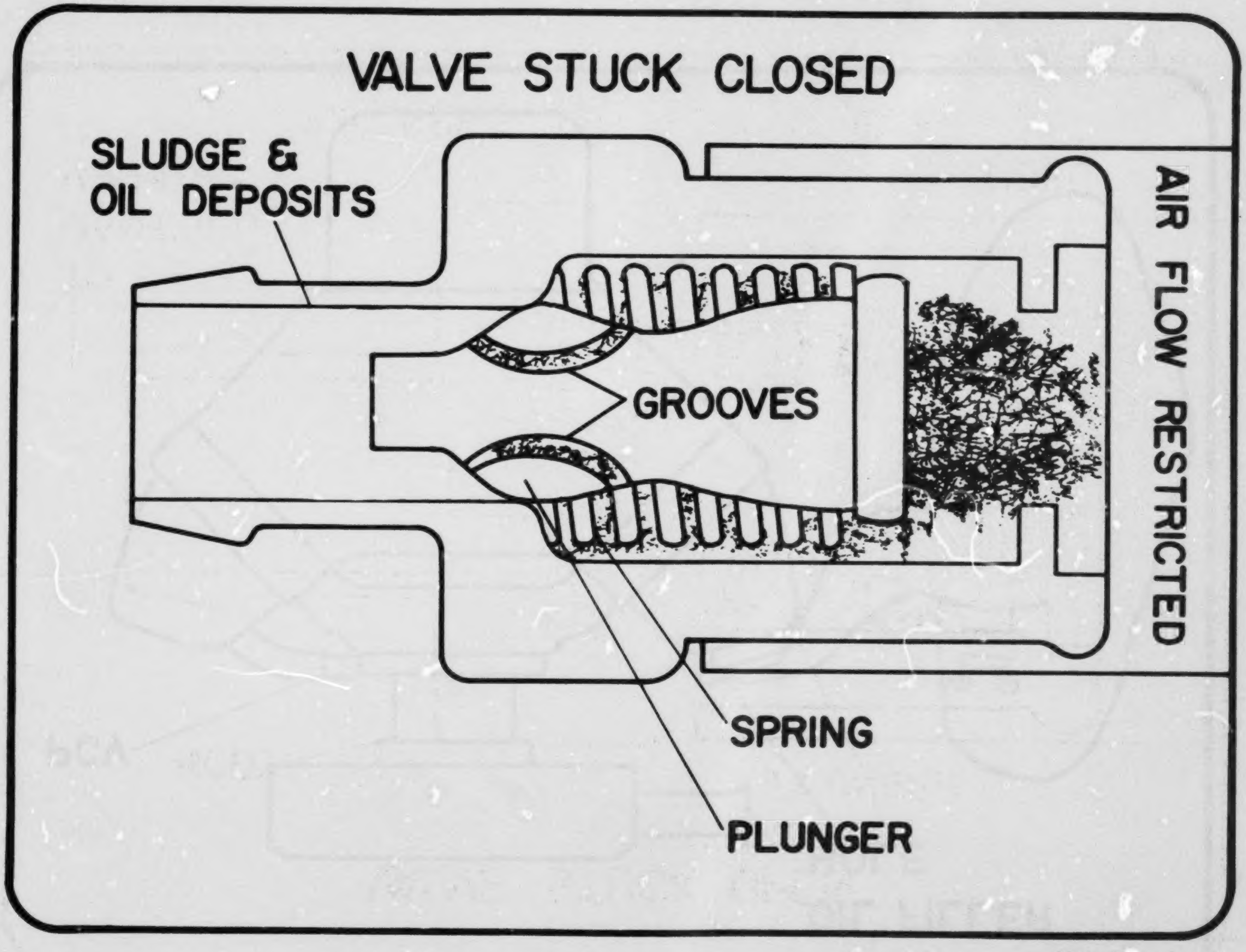

HIGHER SPEED
(MIDDLE POSITION)

VALVE BODY
SPRING
GROOVES
PLUNGER OR VALVE

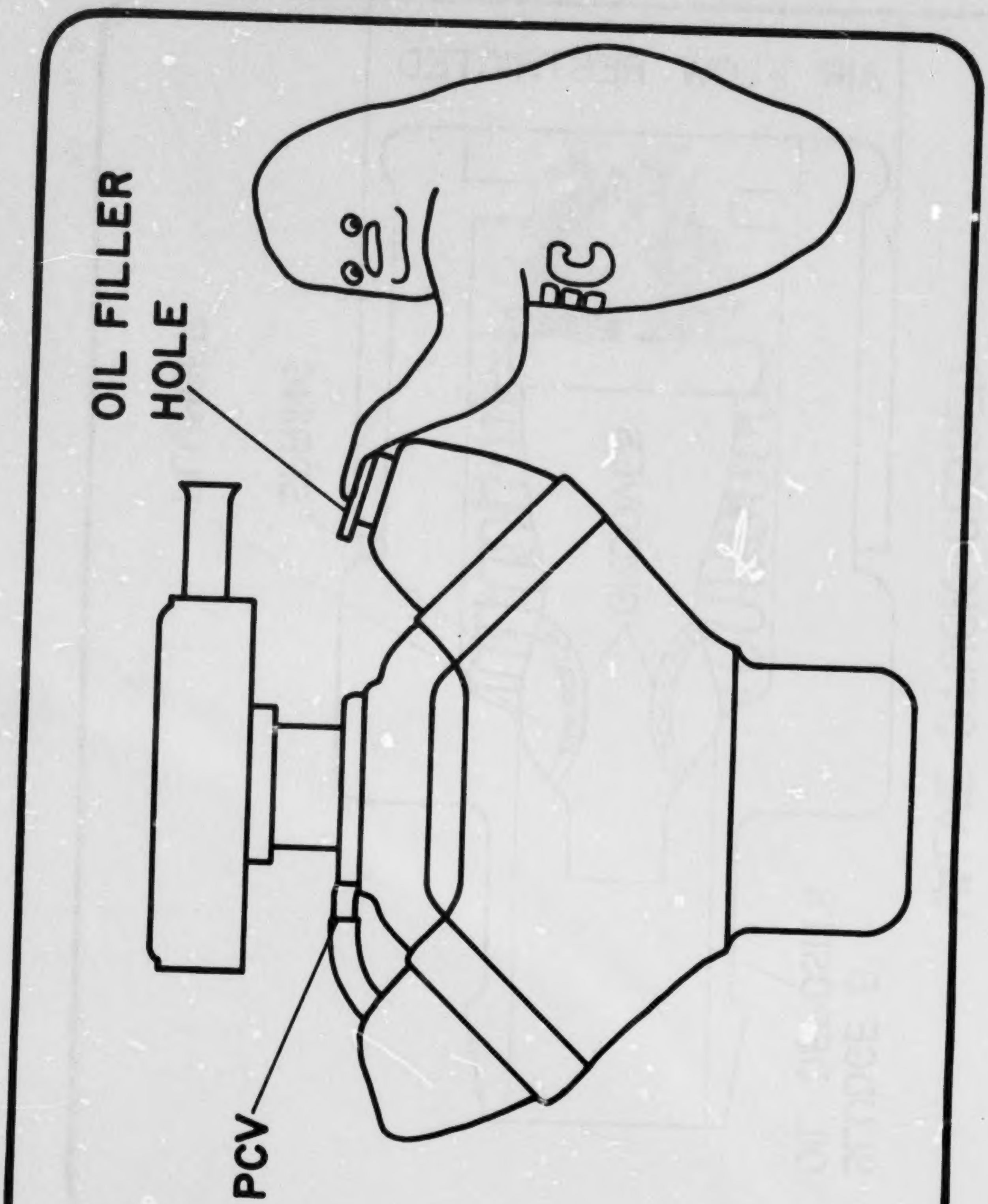
PCV. Fig. 6


VALVE STUCK OPEN
PLUNGER
BODY
HOSE
EXCESSIVE AIR FLOW AT IDLE
TO MANIFOLD VACUUM

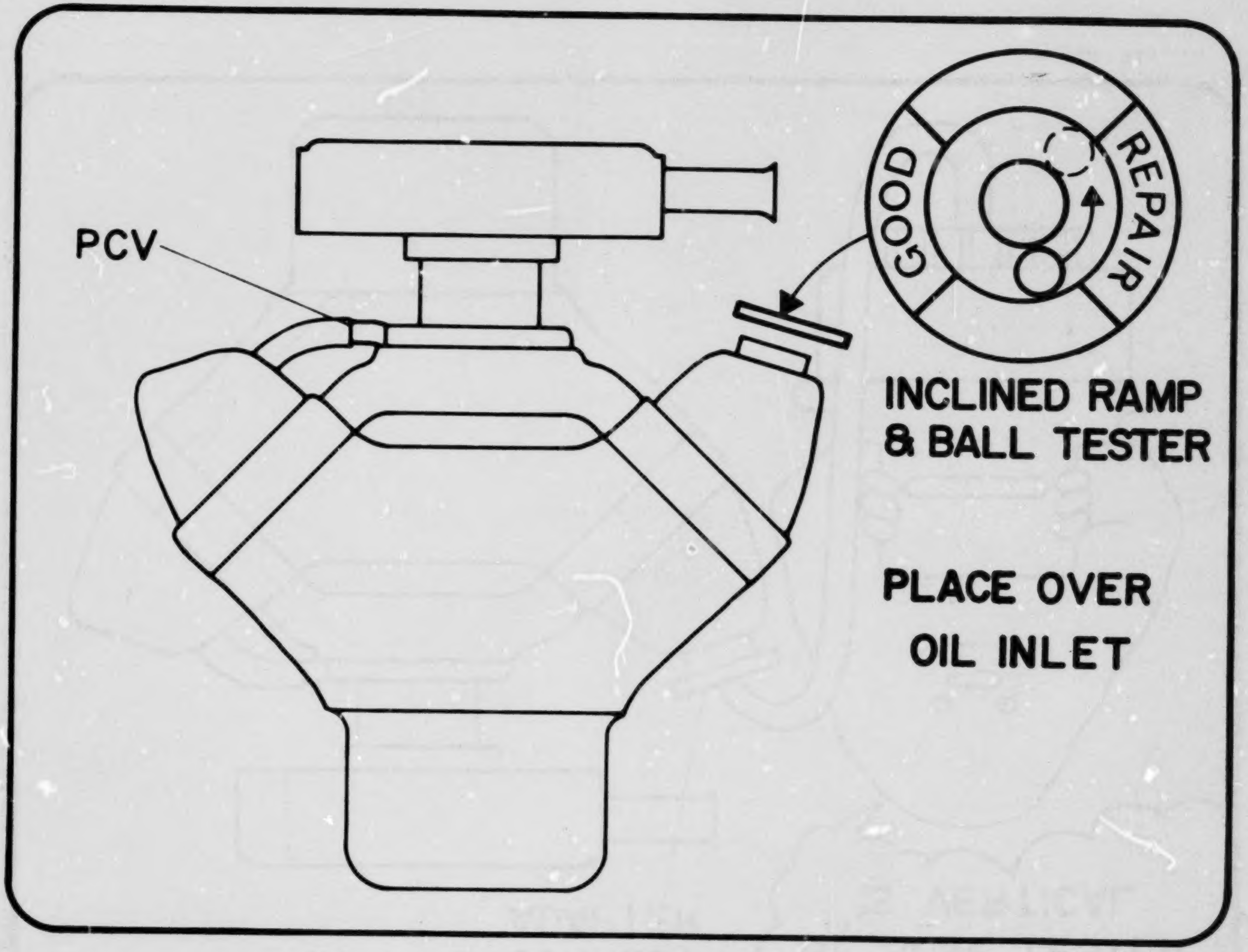
PCV. Fig. 7


VALVE STUCK CLOSED
SLUDGE &
OIL DEPOSITS
GROOVES
AIR FLOW RESTRICTED
SPRING
PLUNGER

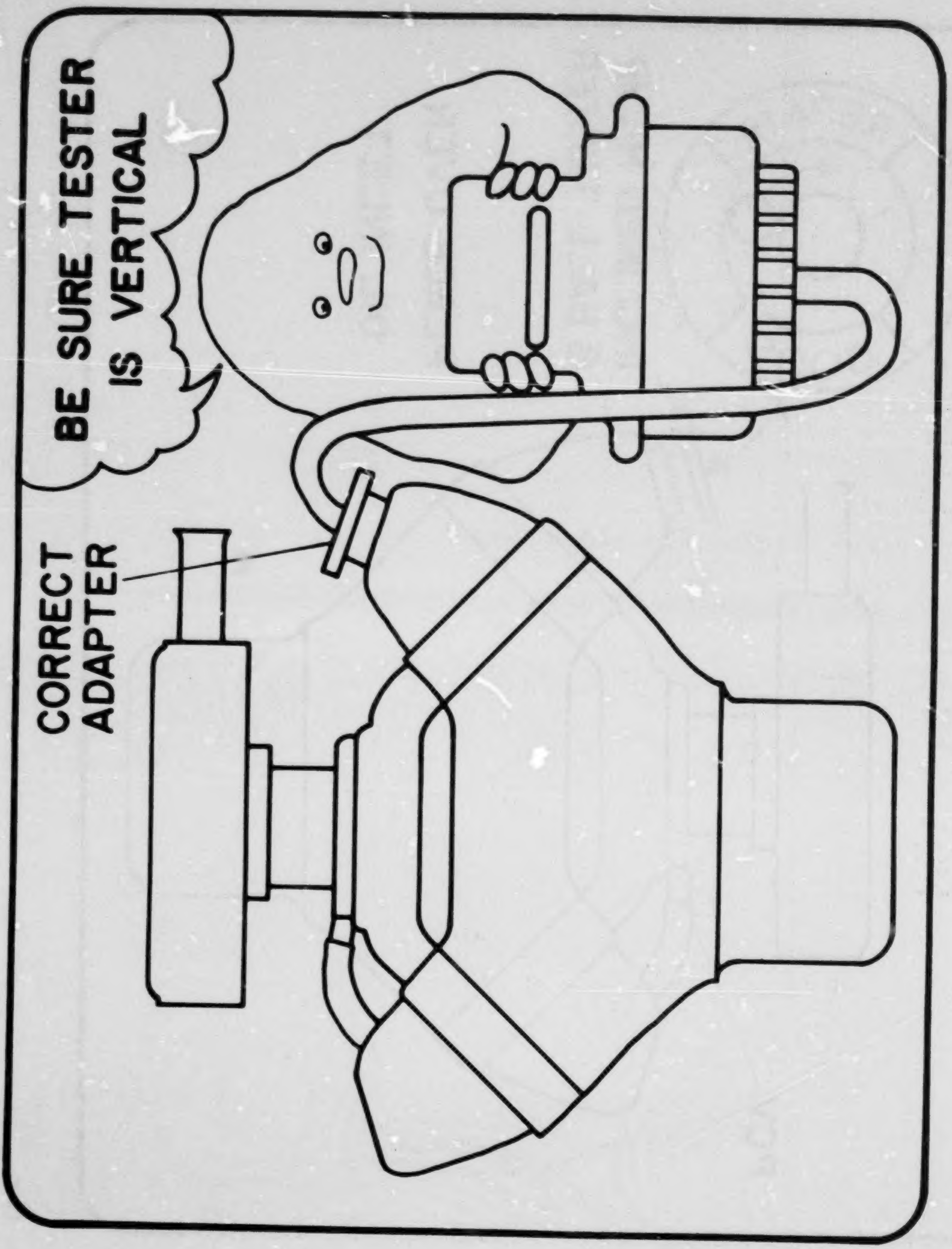
PCV. Fig. 8


OIL FILLER HOLE
PCV

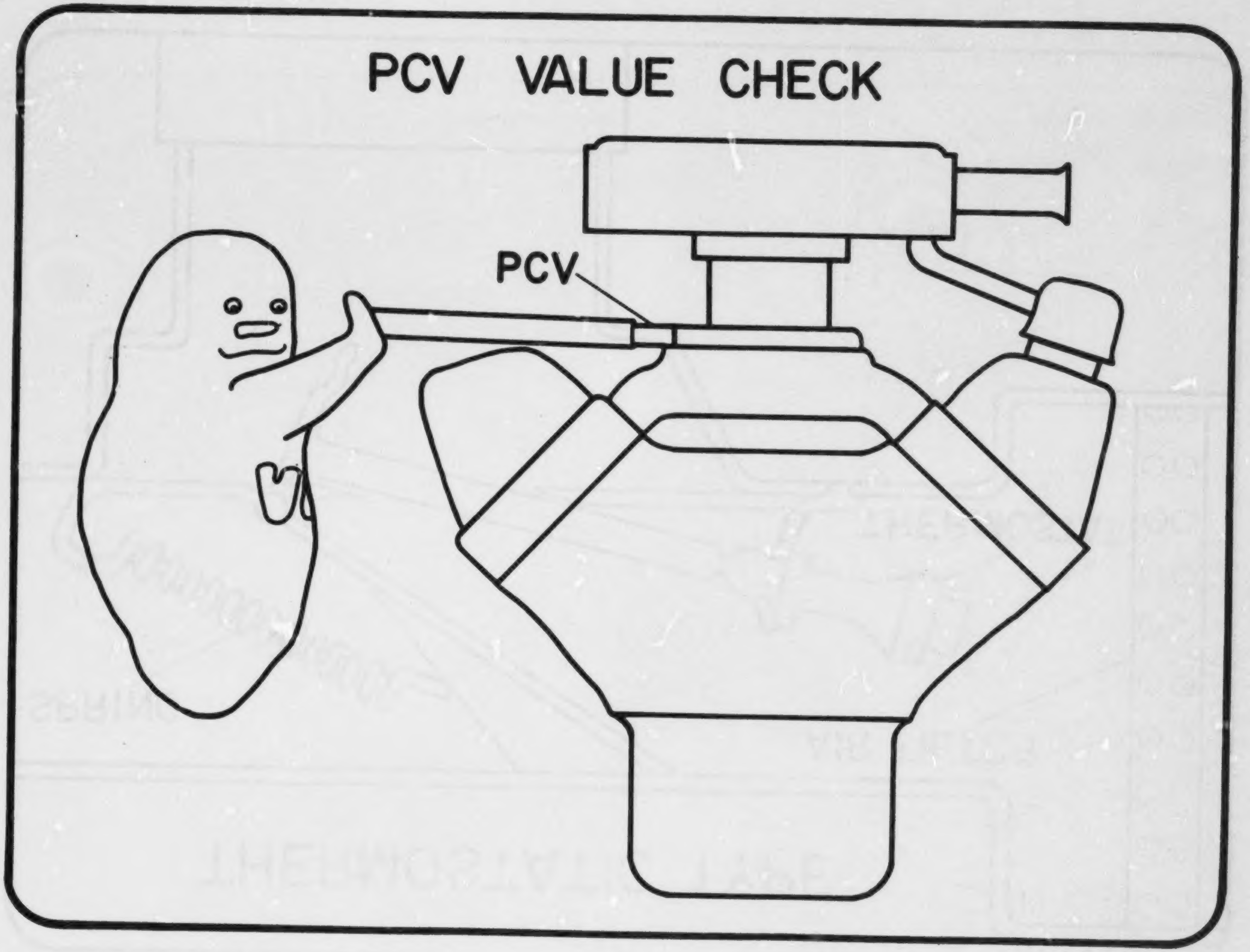
PCV. Fig. 9


PCV
GOOD
REPAIR
INCLINED RAMP
& BALL TESTER
PLACE OVER
OIL INLET

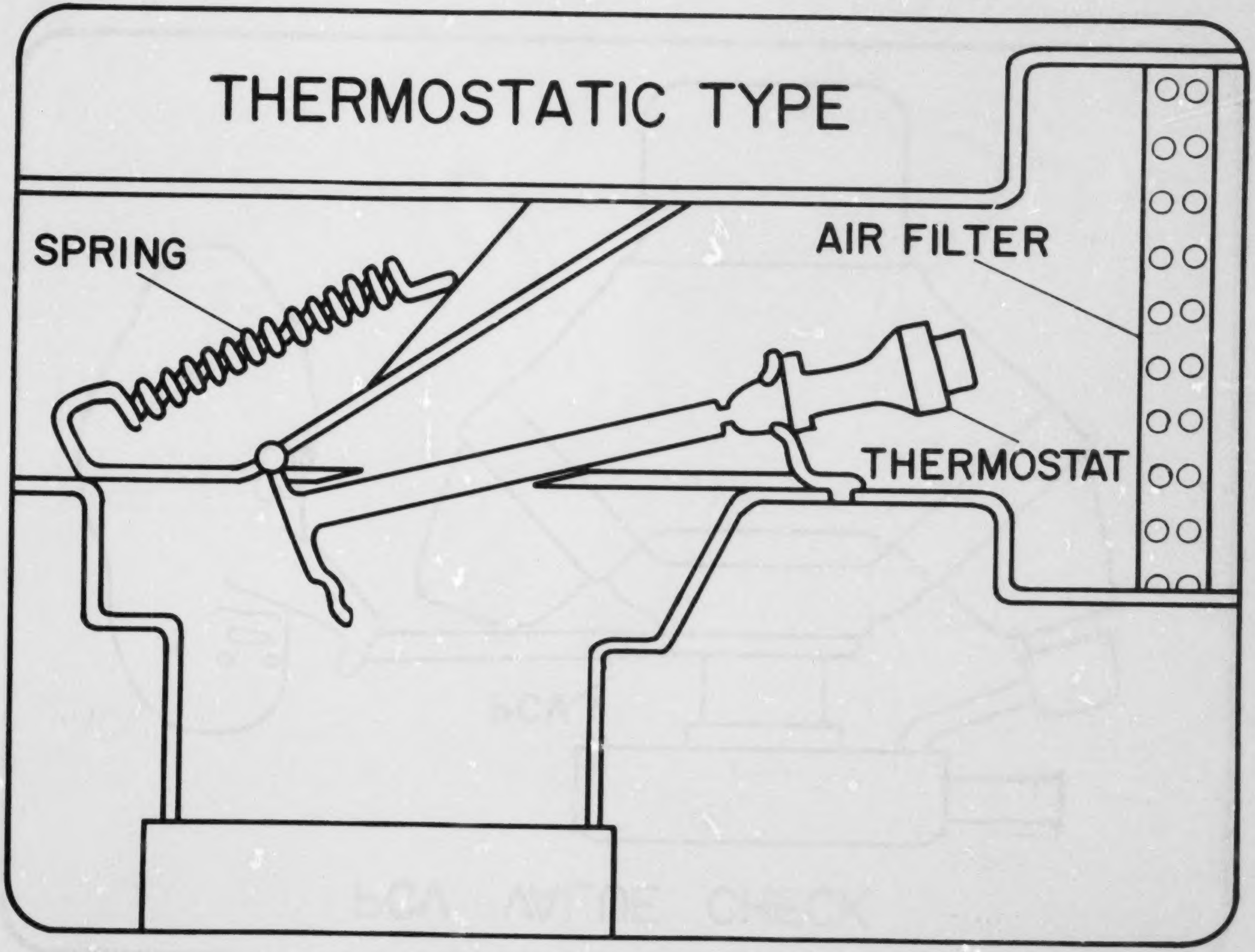
PCV. Fig. 10


BE SURE TESTER IS VERTICAL
CORRECT ADAPTER

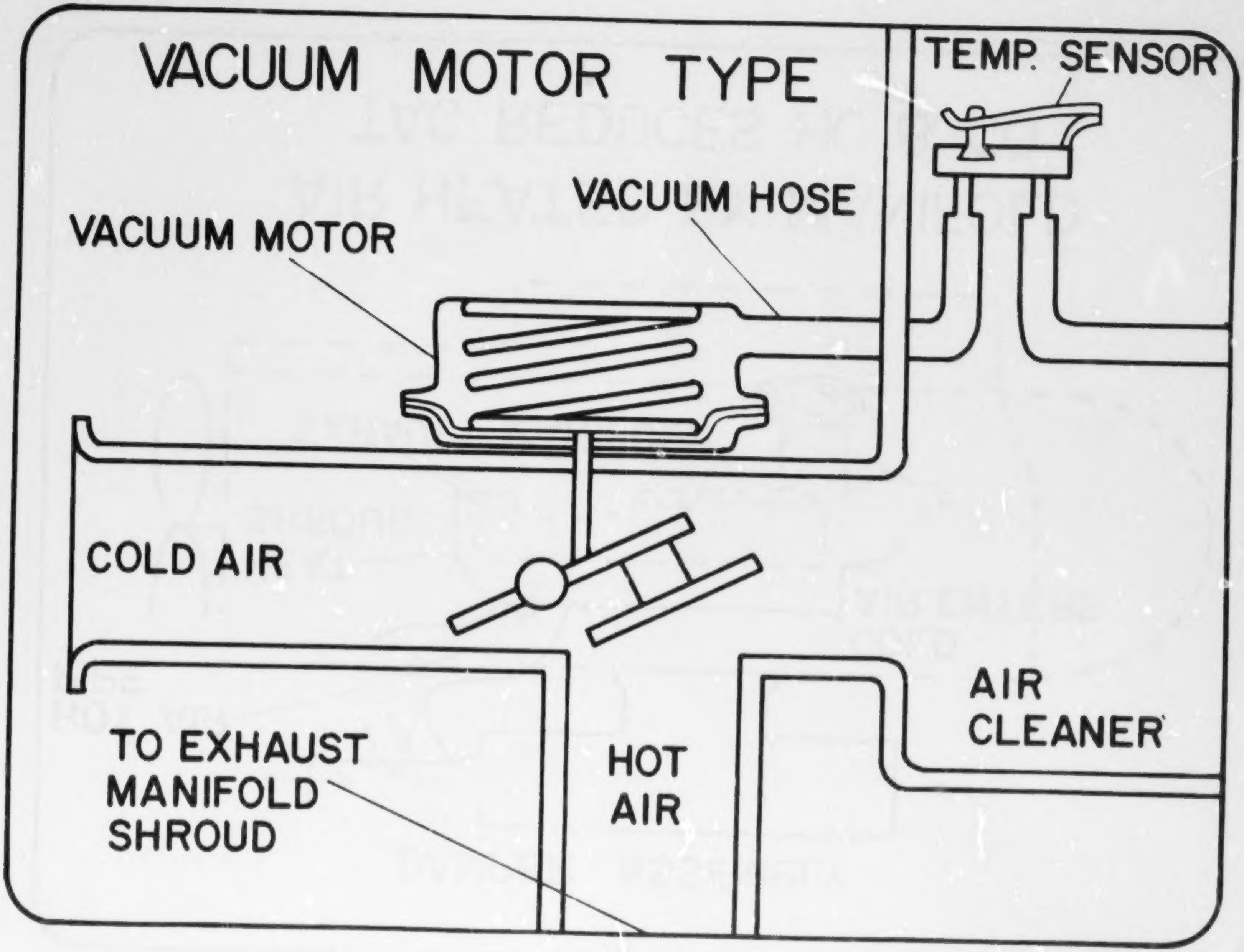
PCV. Fig. 11


PCV VALUE CHECK
PCV

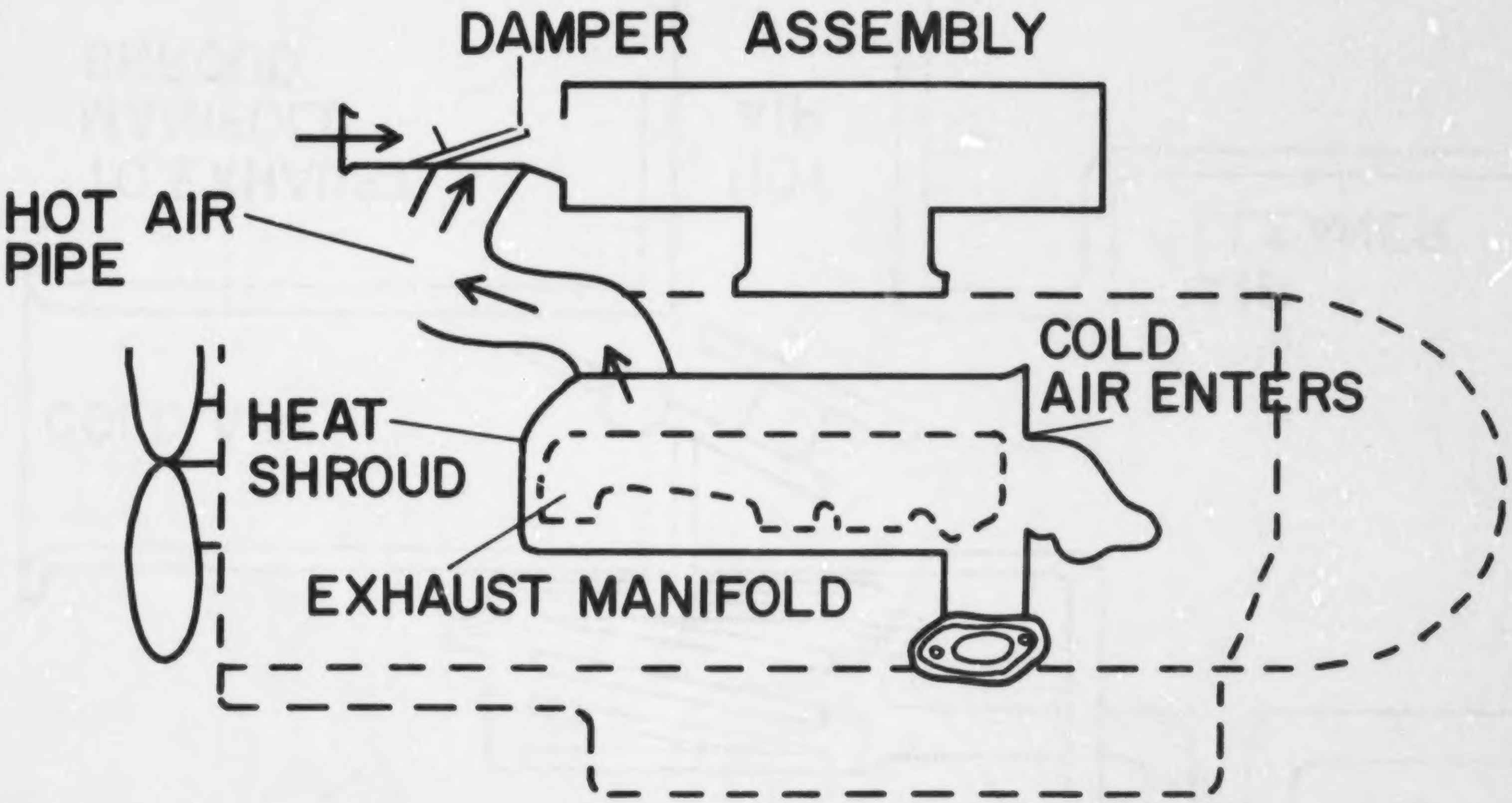
PCV. Fig. 12


THERMOSTATIC TYPE
SPRING
AIR FILTER
THERMOSTAT

TAC Fig. 1

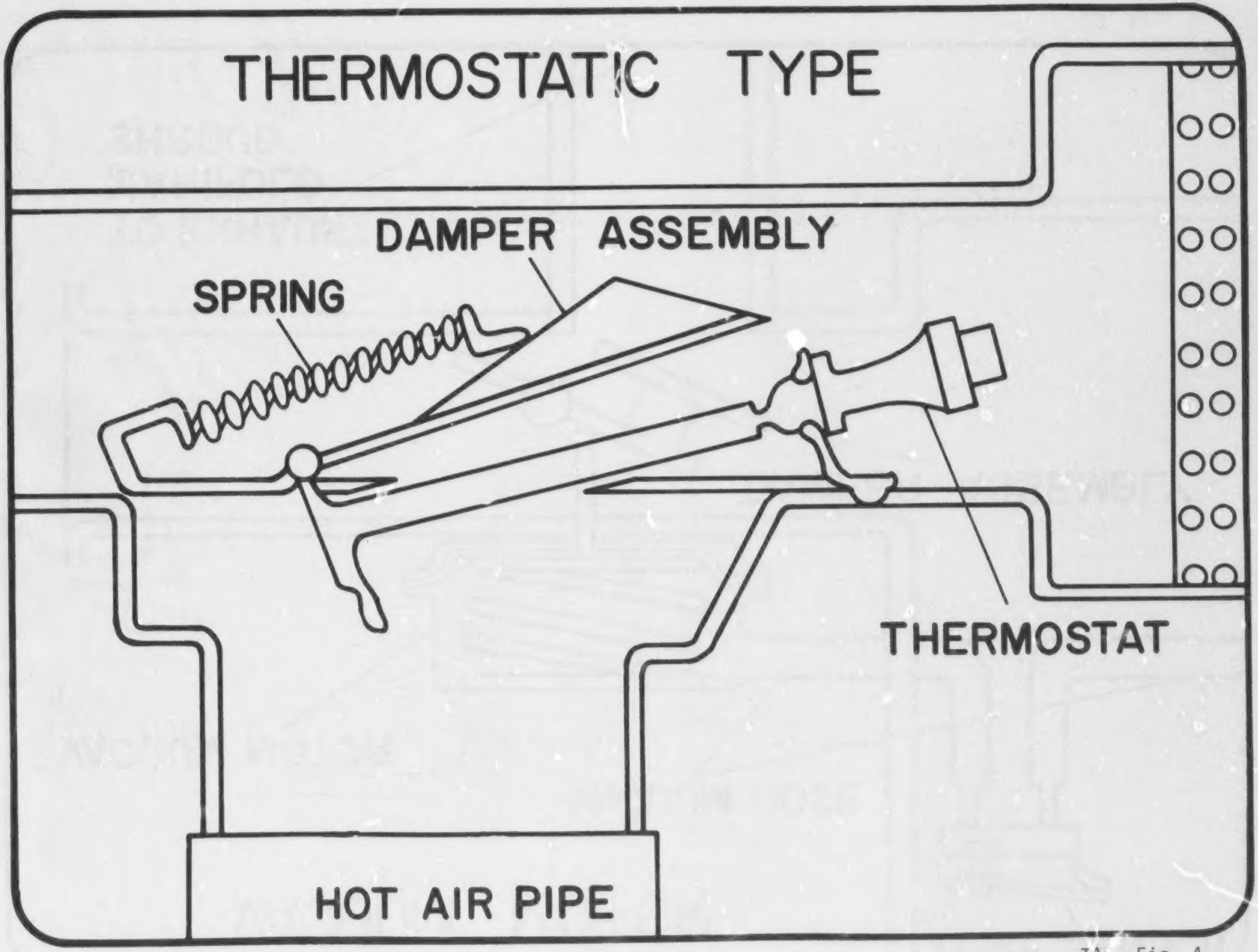

VACUUM MOTOR TYPE
TEMP. SENSOR
VACUUM HOSE
VACUUM MOTOR
COLD AIR
AIR CLEANER
TO EXHAUST MANIFOLD SHROUD
HOT AIR

TAC. Fig. 2

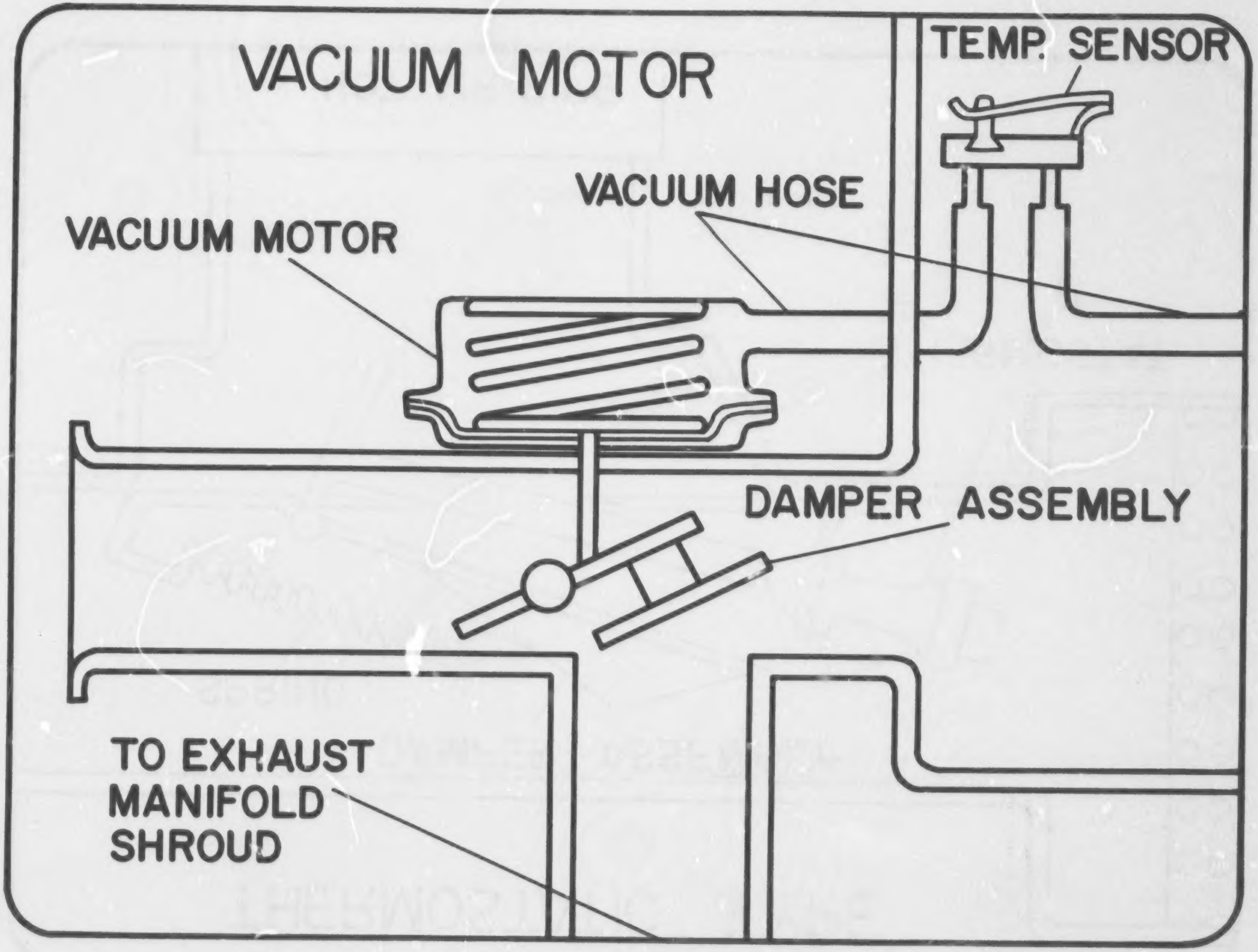

DAMPER ASSEMBLY
HOT AIR PIPE
COLD AIR ENTERS
HEAT SHROUD
EXHAUST MANIFOLD

AIR HEATED BY MANIFOLD
TAC REDUCES HC & CO

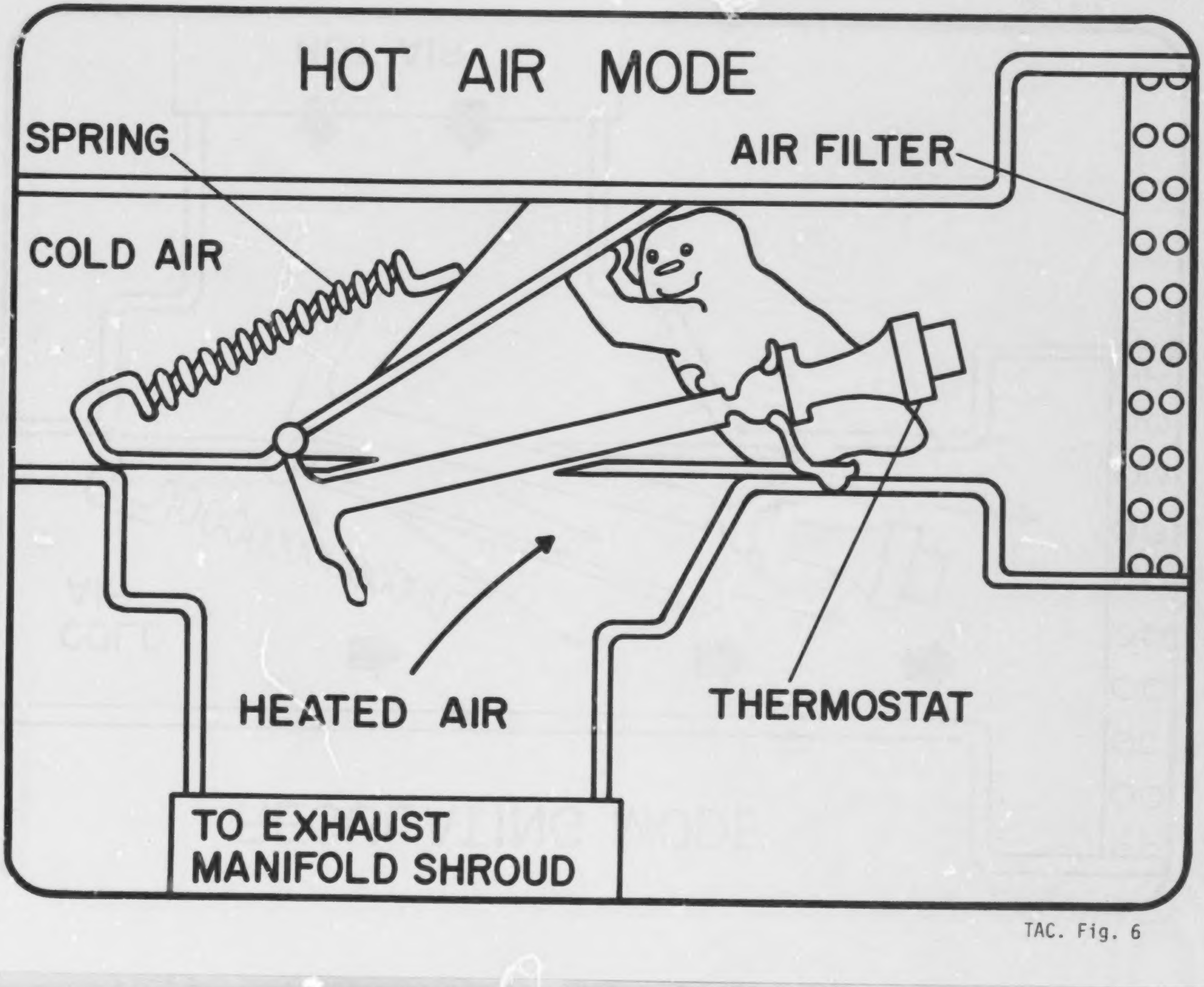
TAC. Fig. 3


THERMOSTATIC TYPE
DAMPER ASSEMBLY
SPRING
THERMOSTAT
HOT AIR PIPE

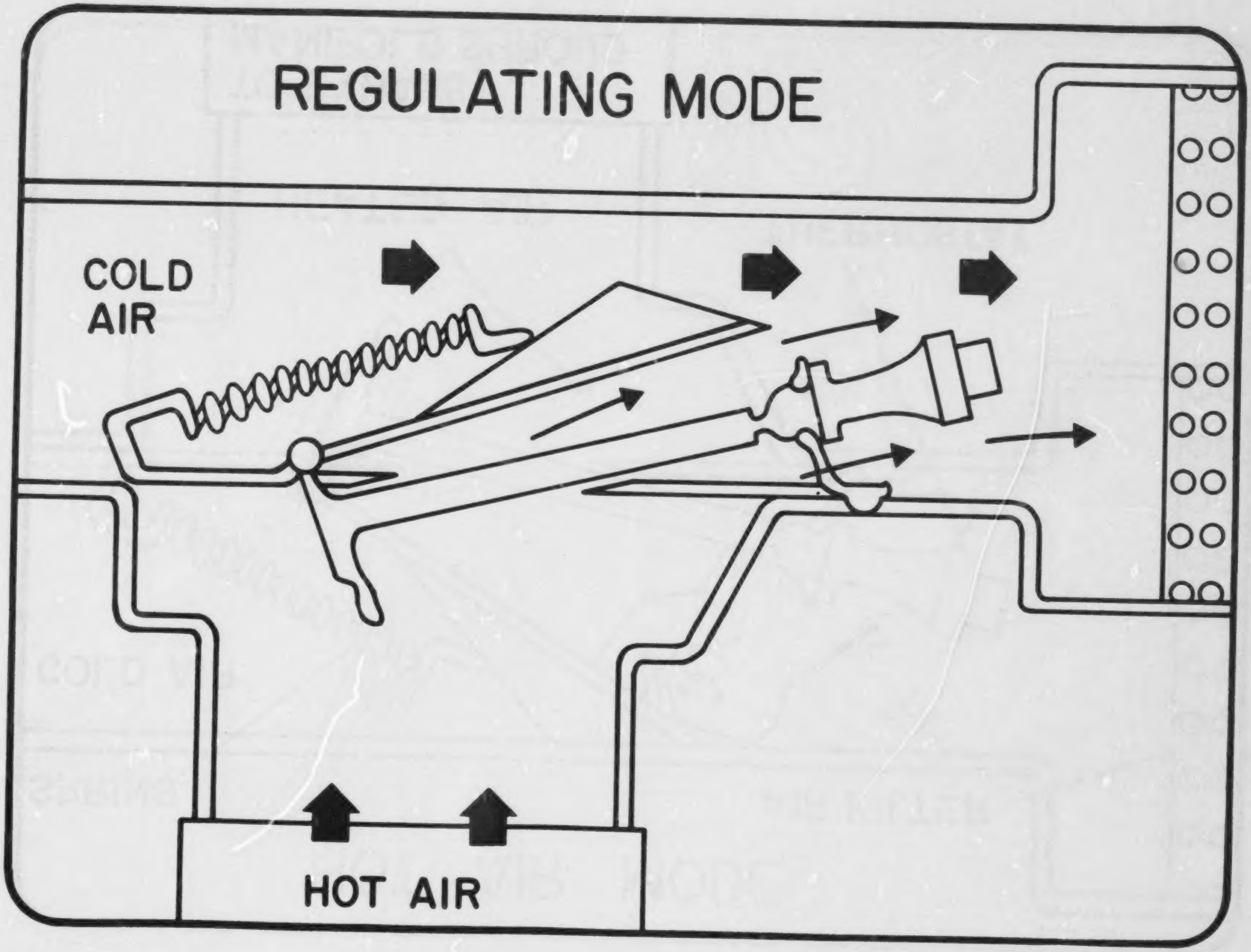
TAC. Fig. 4


VACUUM MOTOR
TEMP. SENSOR
VACUUM HOSE
VACUUM MOTOR
DAMPER ASSEMBLY
TO EXHAUST MANIFOLD SHROUD

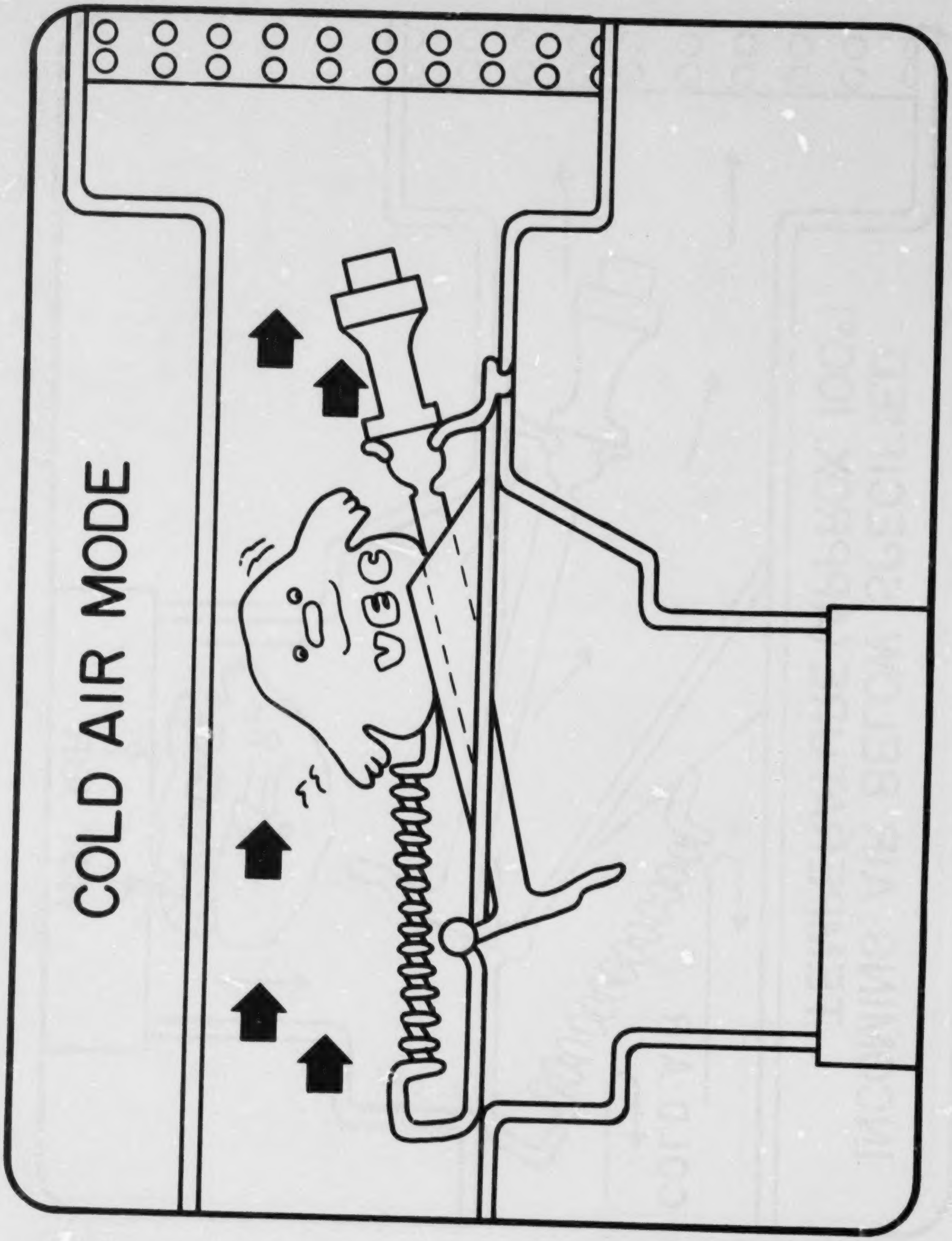
TAC. Fig. 5


HOT AIR MODE
SPRING
AIR FILTER
COLD AIR
HEATED AIR
THERMOSTAT
TO EXHAUST
MANIFOLD SHROUD

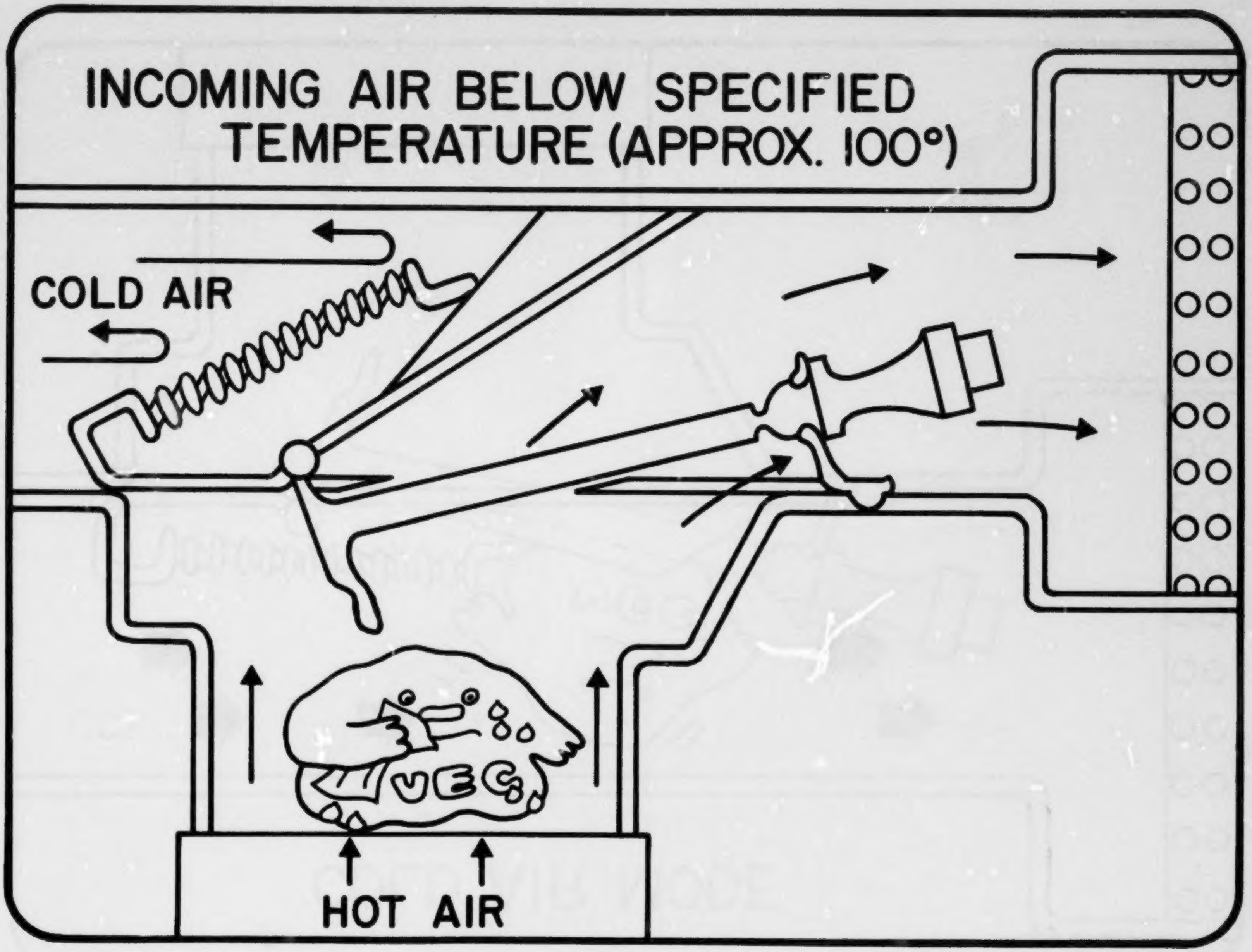
TAC. Fig. 6


REGULATING MODE
COLD AIR
HOT AIR

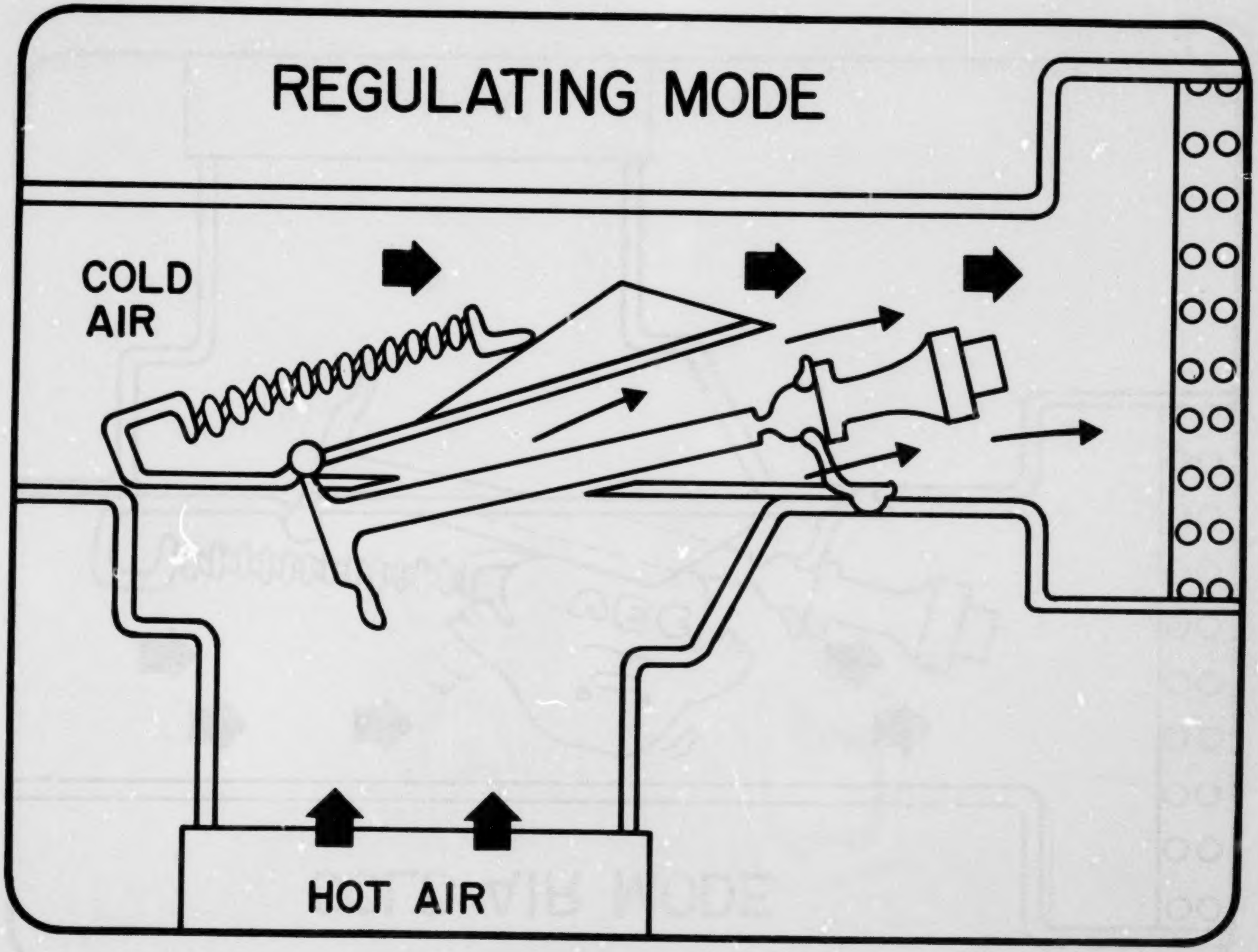
TAC. Fig. 7


COLD AIR MODE
VEG

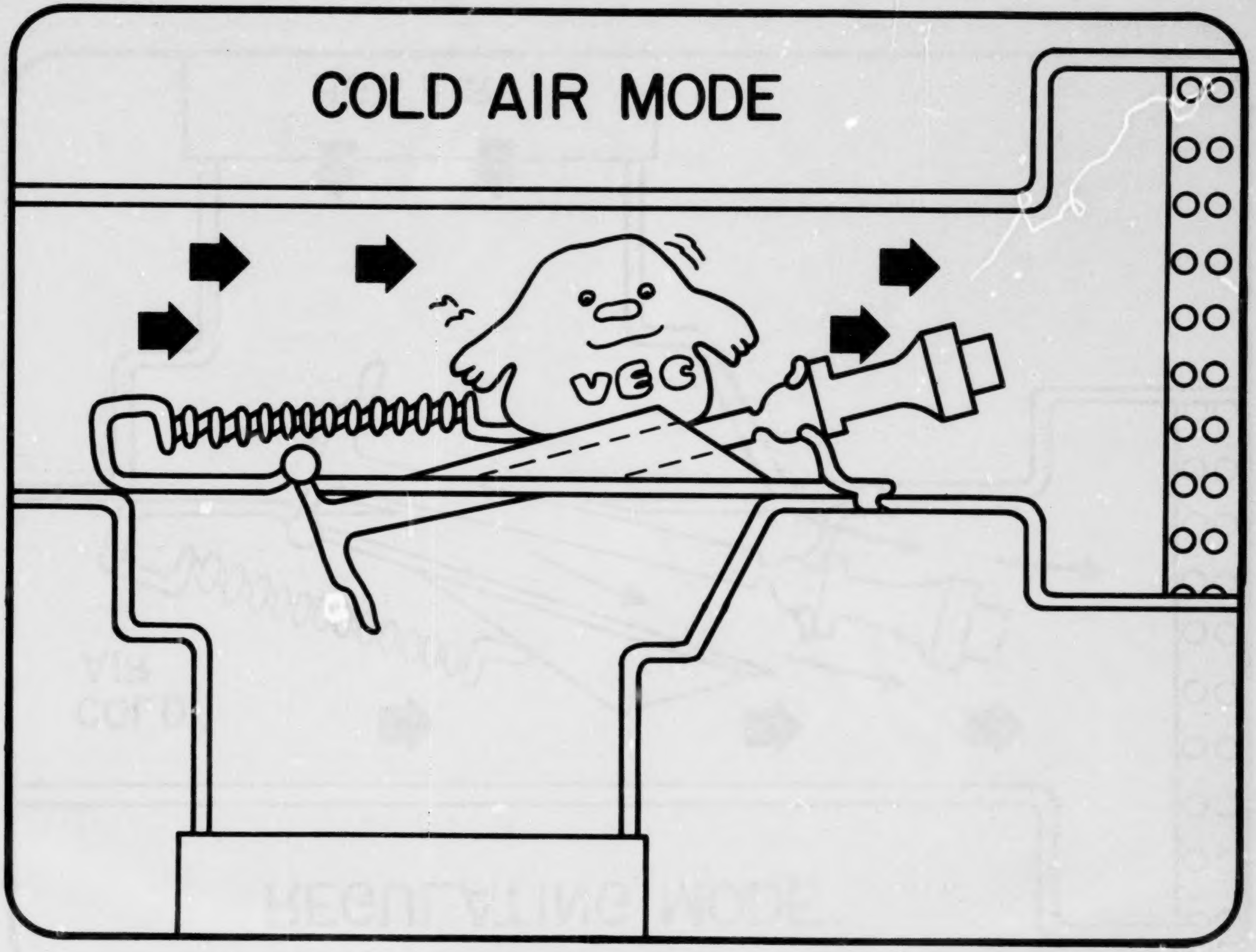
TAC. Fig. 8


INCOMING AIR BELOW SPECIFIED
TEMPERATURE (APPROX. 100°)
COLD AIR
VEG
HOT AIR

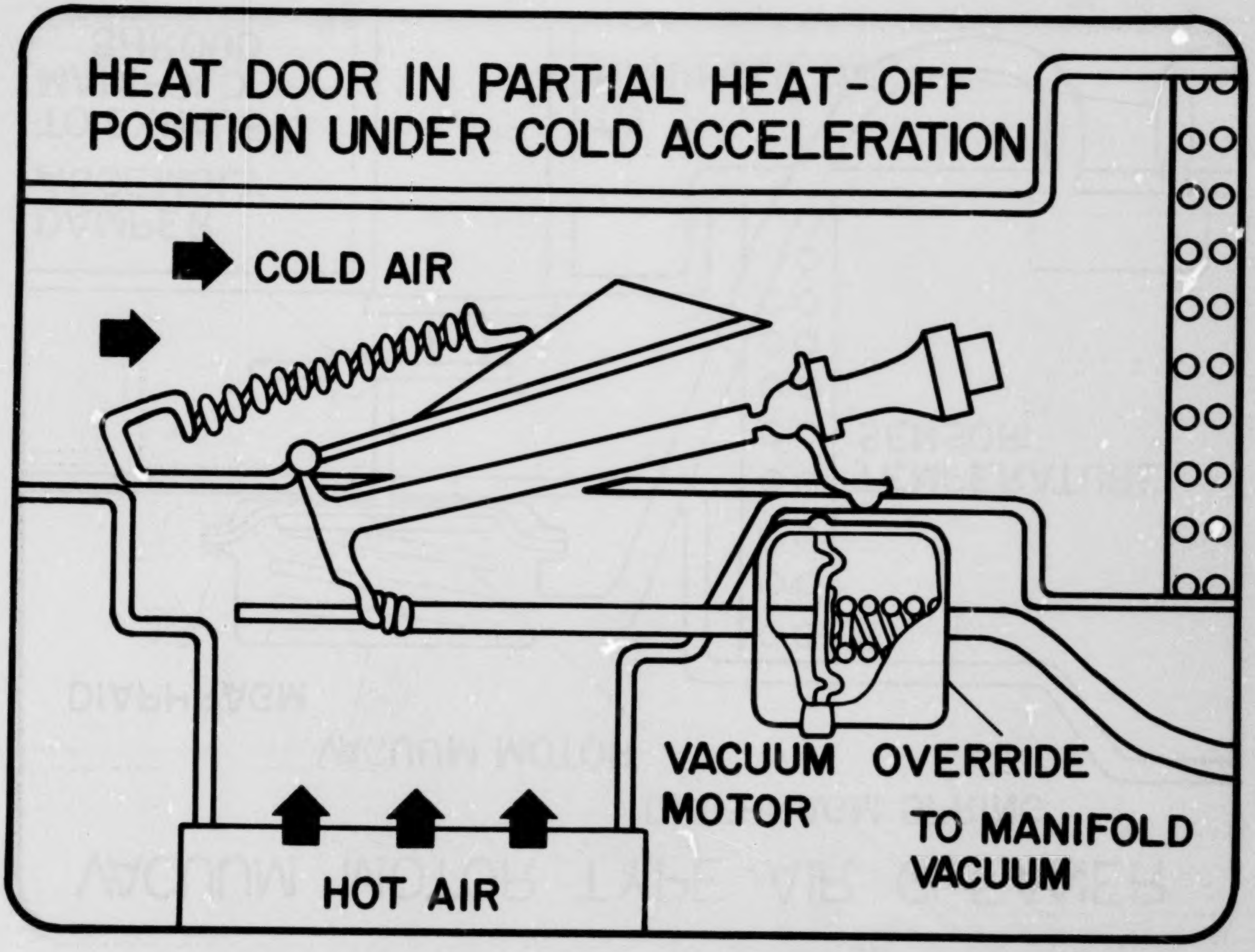
TAC. Fig. 9


REGULATING MODE
COLD AIR
HOT AIR

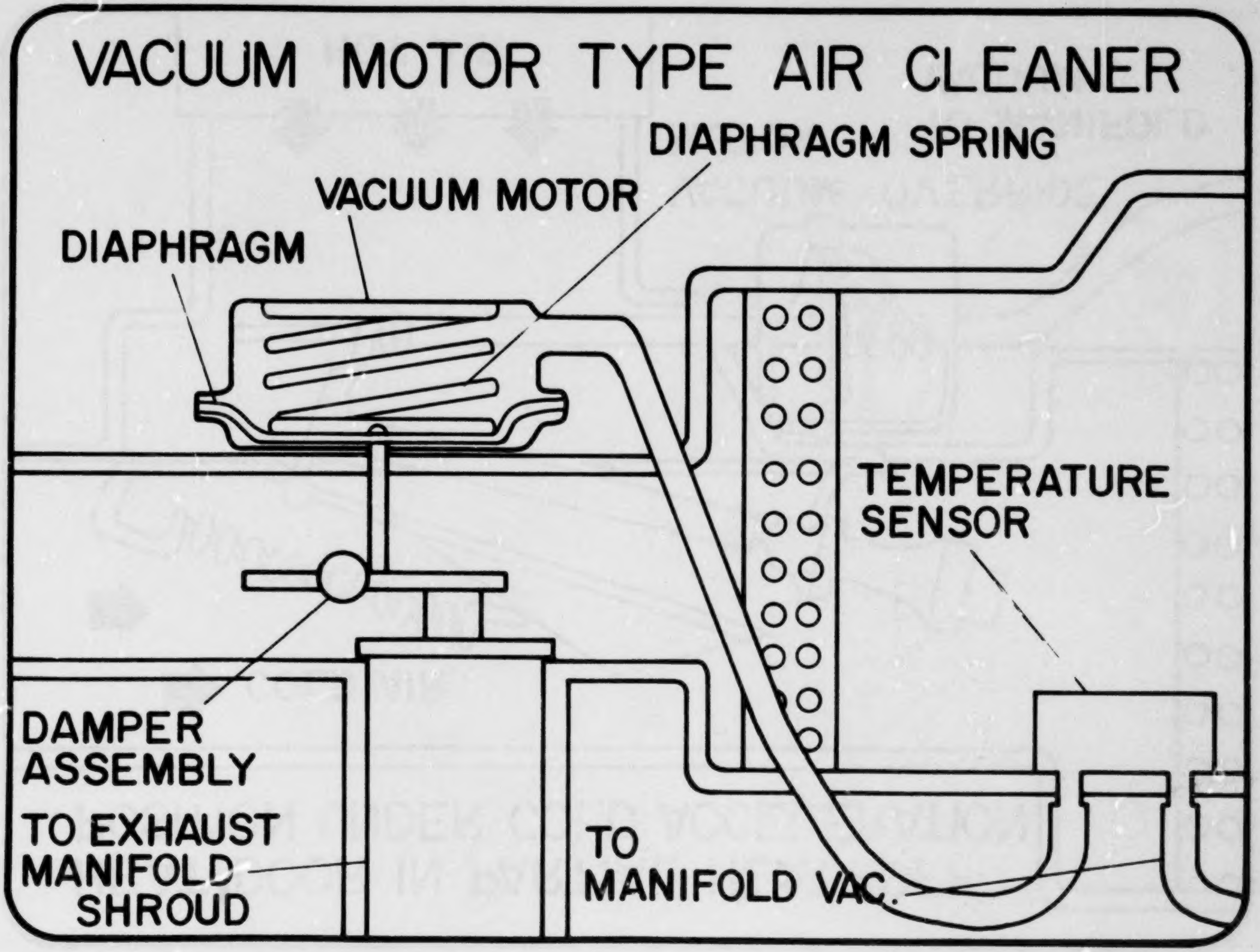
TAC. Fig. 10


COLD AIR MODE

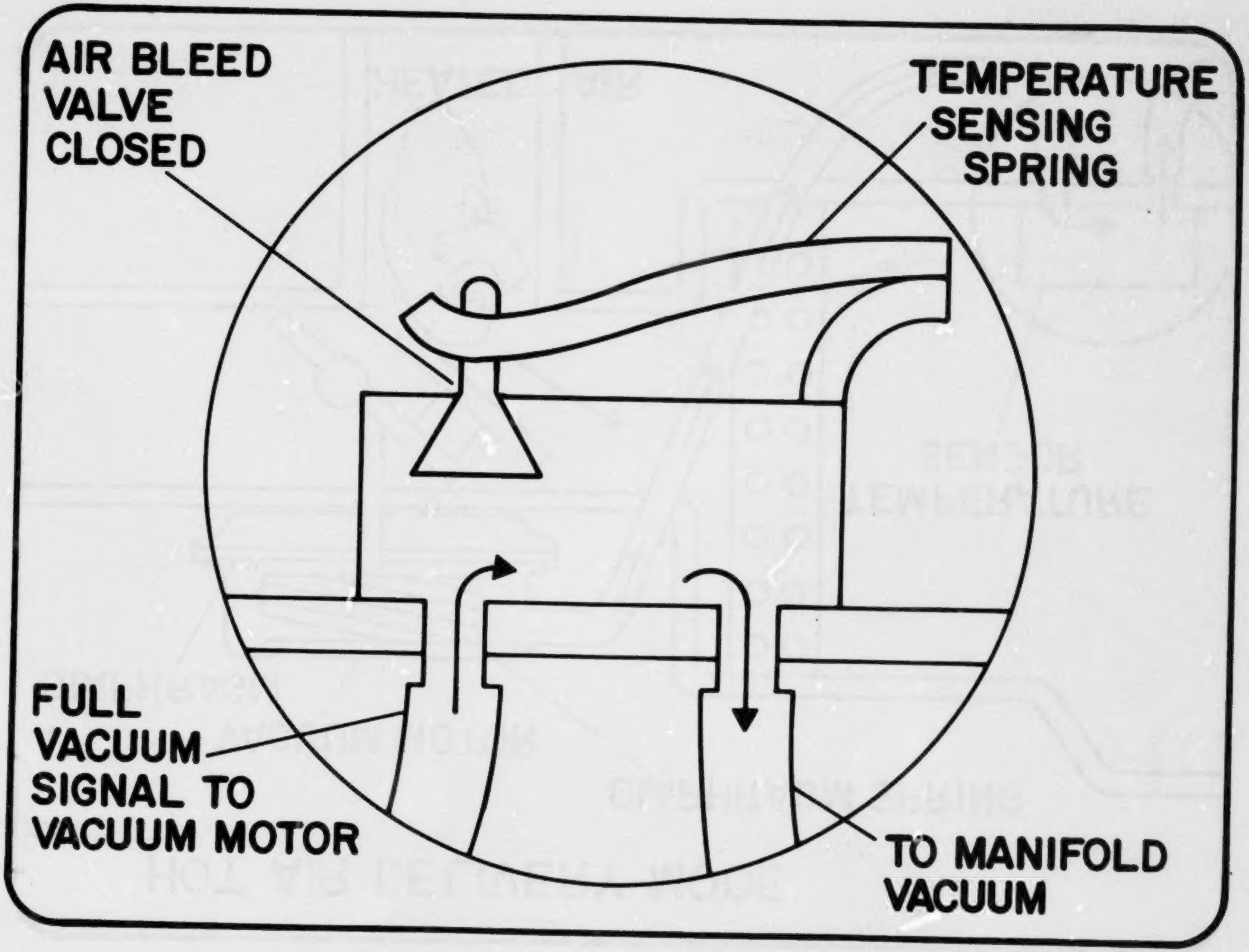
TAC. Fig. 11


HEAT DOOR IN PARTIAL HEAT-OFF POSITION UNDER COLD ACCELERATION
COLD AIR
VACUUM MOTOR
OVERRIDE
TO MANIFOLD VACUUM
HOT AIR

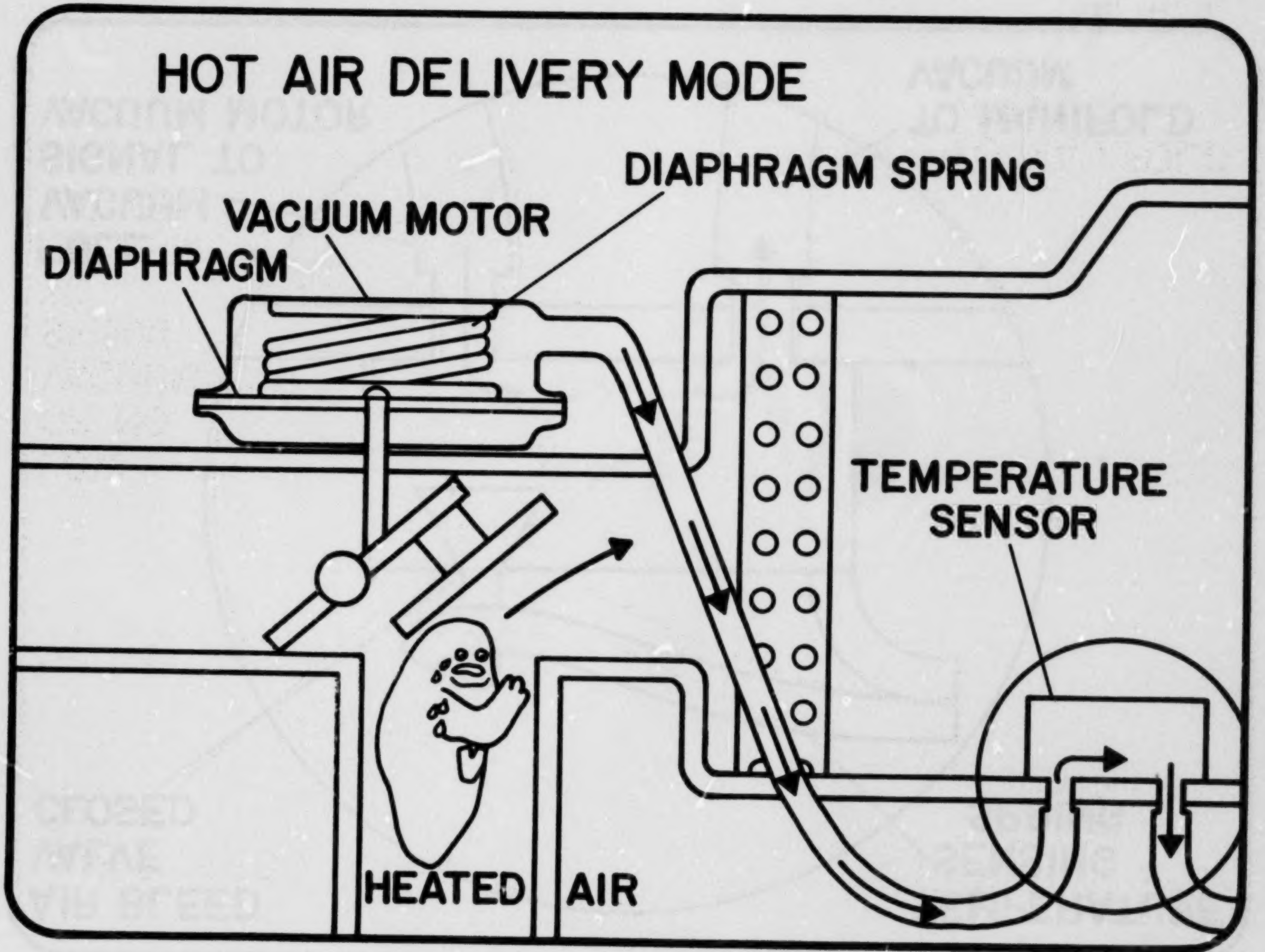
TAC. Fig. 12


VACUUM MOTOR TYPE AIR CLEANER
DIAPHRAGM SPRING
VACUUM MOTOR
DIAPHRAGM
TEMPERATURE SENSOR
DAMPER ASSEMBLY
TO EXHAUST MANIFOLD SHROUD
TO MANIFOLD VAC.

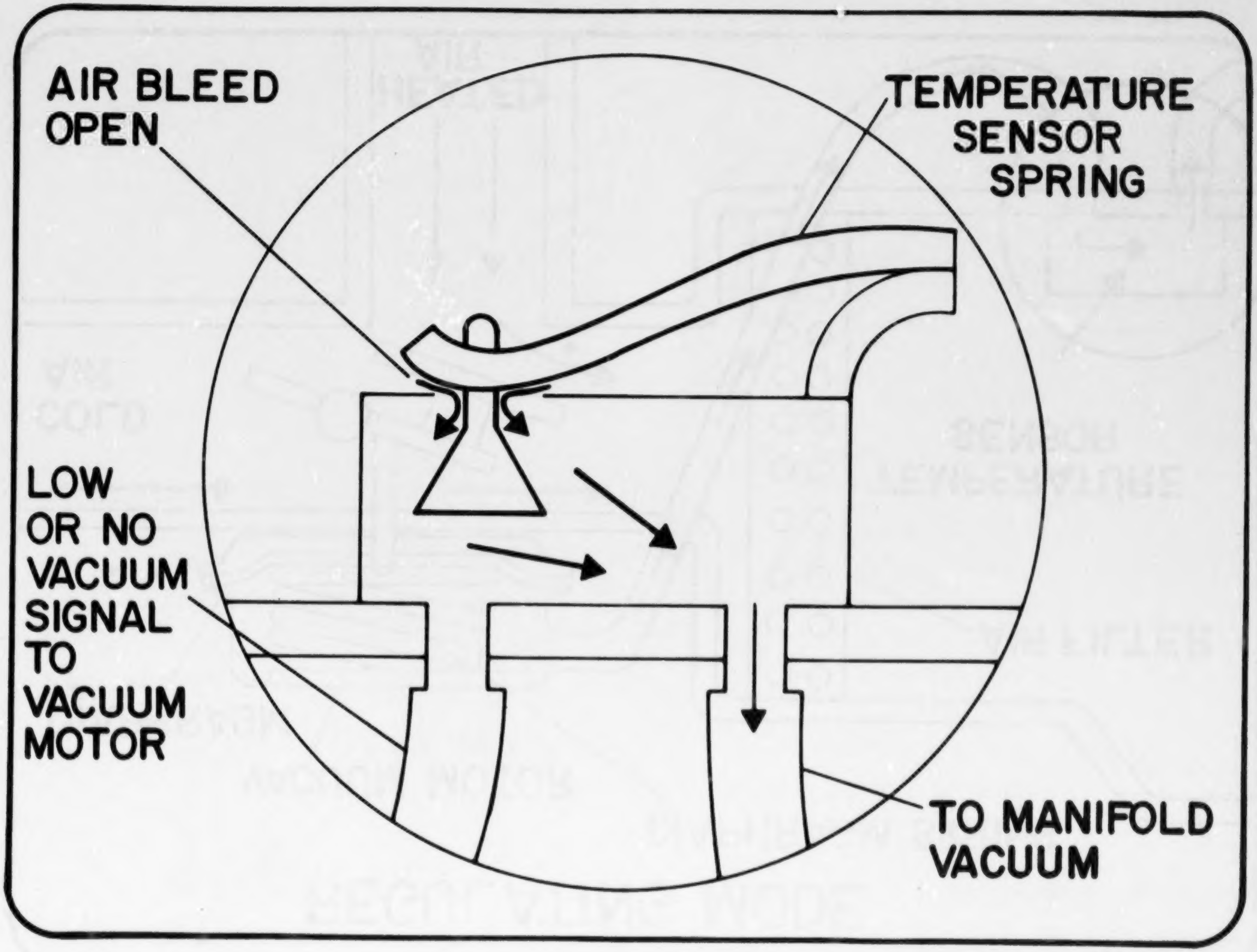
TAC. Fig. 13


AIR BLEED VALVE CLOSED
TEMPERATURE SENSING SPRING
FULL VACUUM SIGNAL TO VACUUM MOTOR
TO MANIFOLD VACUUM

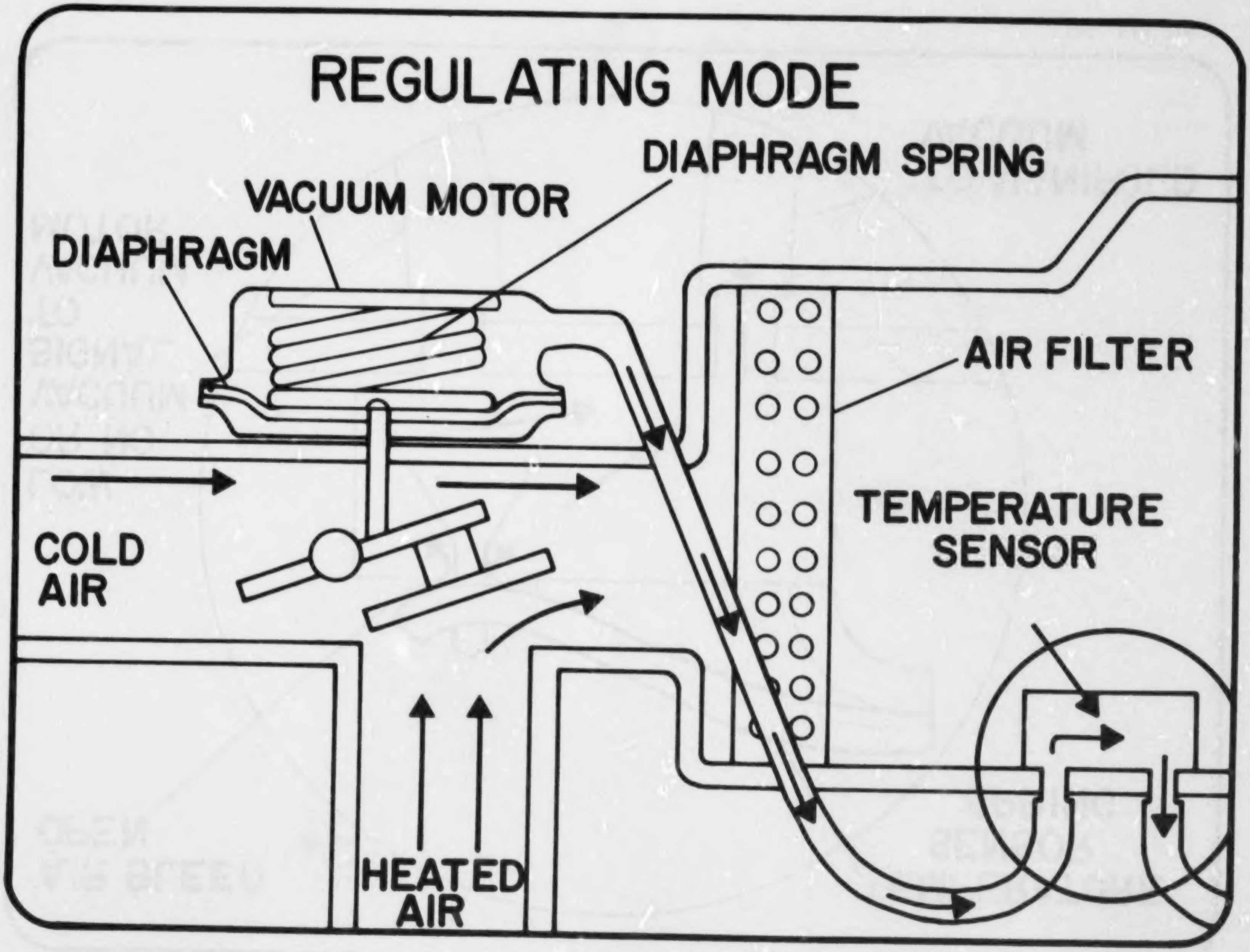
TAC. Fig. 14


HOT AIR DELIVERY MODE
DIAPHRAGM SPRING
VACUUM MOTOR
DIAPHRAGM
TEMPERATURE SENSOR
HEATED AIR

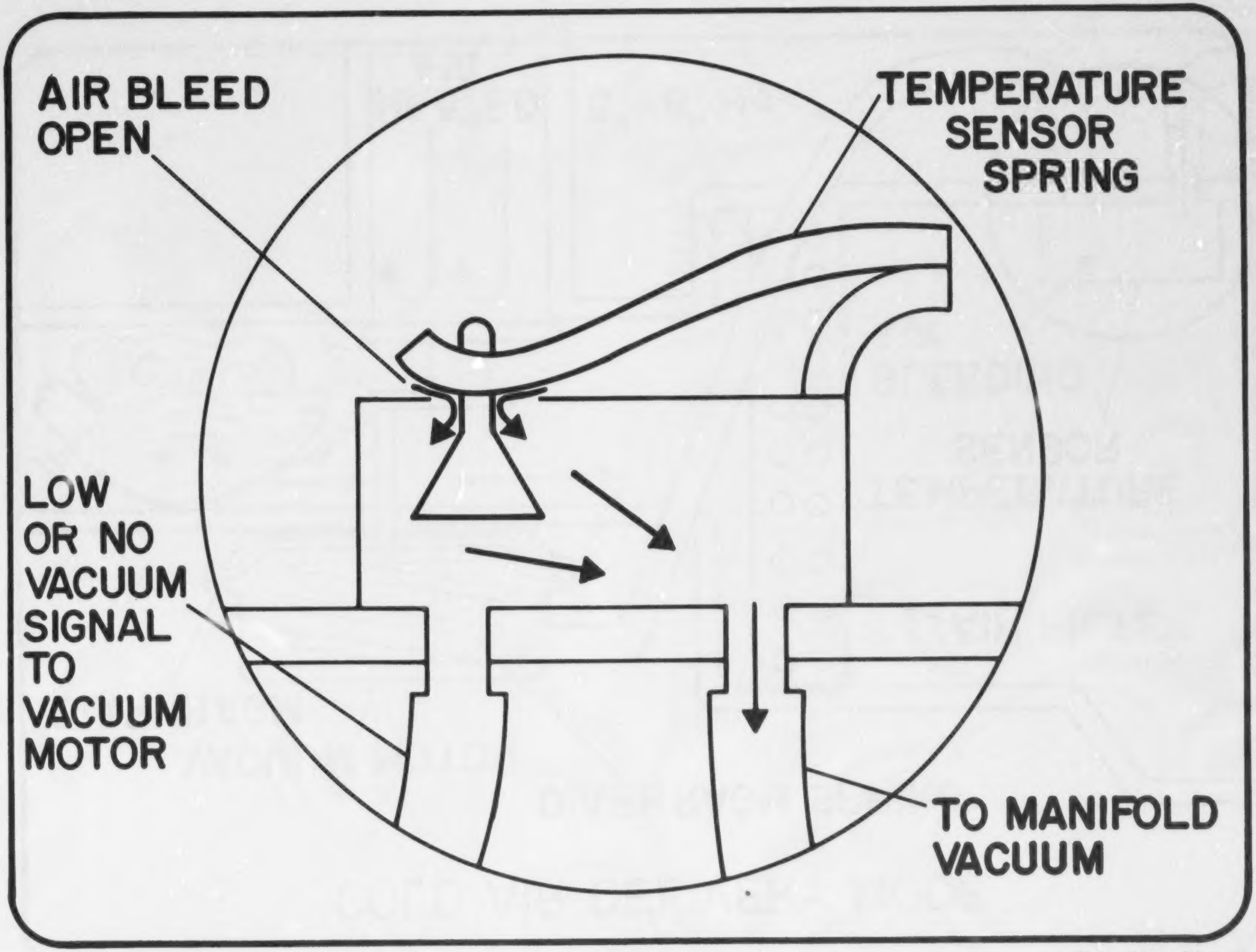
TAC. Fig. 15


AIR BLEED OPEN
TEMPERATURE SENSOR SPRING
LOW OR NO VACUUM SIGNAL TO VACUUM MOTOR
TO MANIFOLD VACUUM

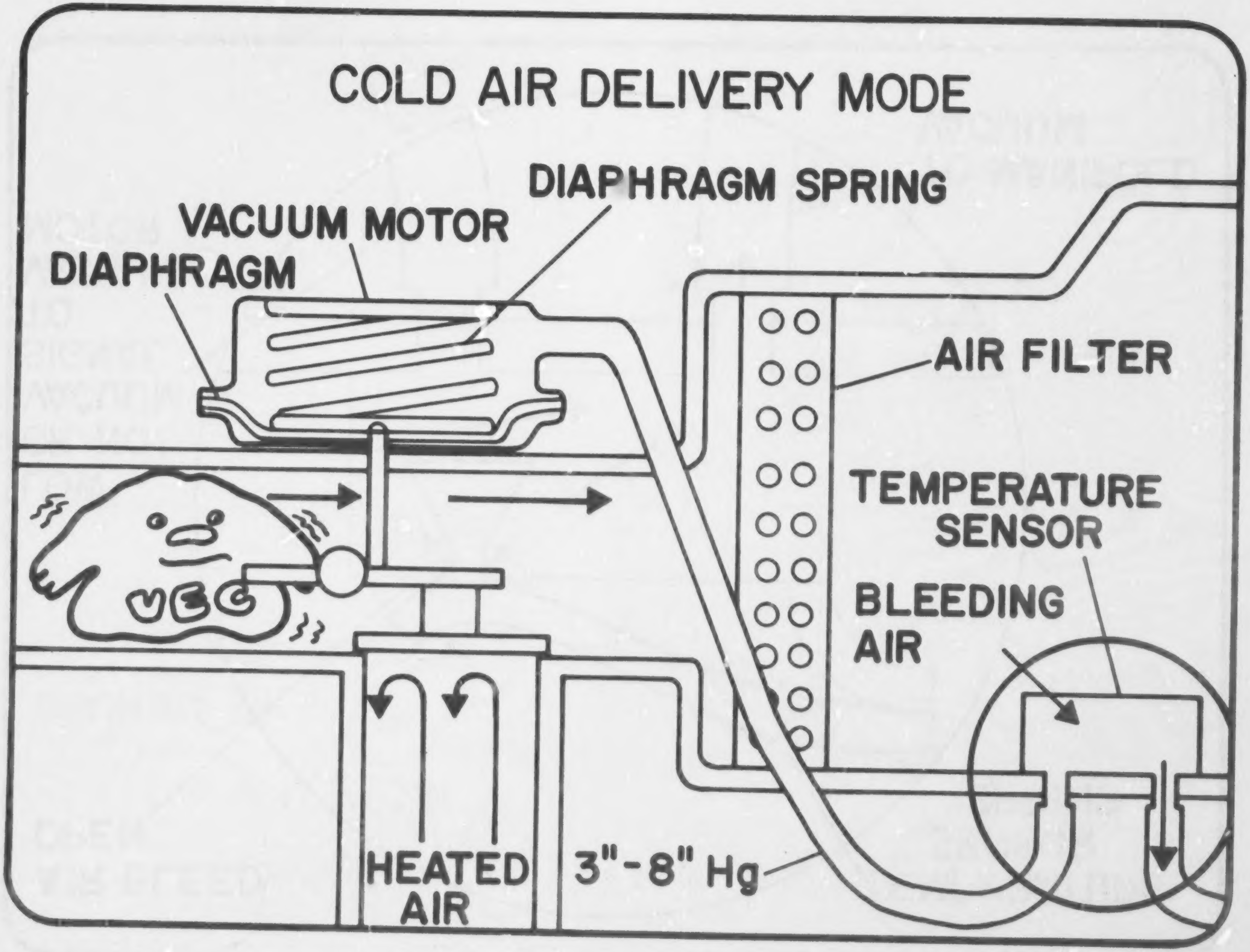
TAC. Fig. 16


REGULATING MODE
DIAPHRAGM SPRING
VACUUM MOTOR
DIAPHRAGM
AIR FILTER
TEMPERATURE SENSOR
COLD AIR
HEATED AIR

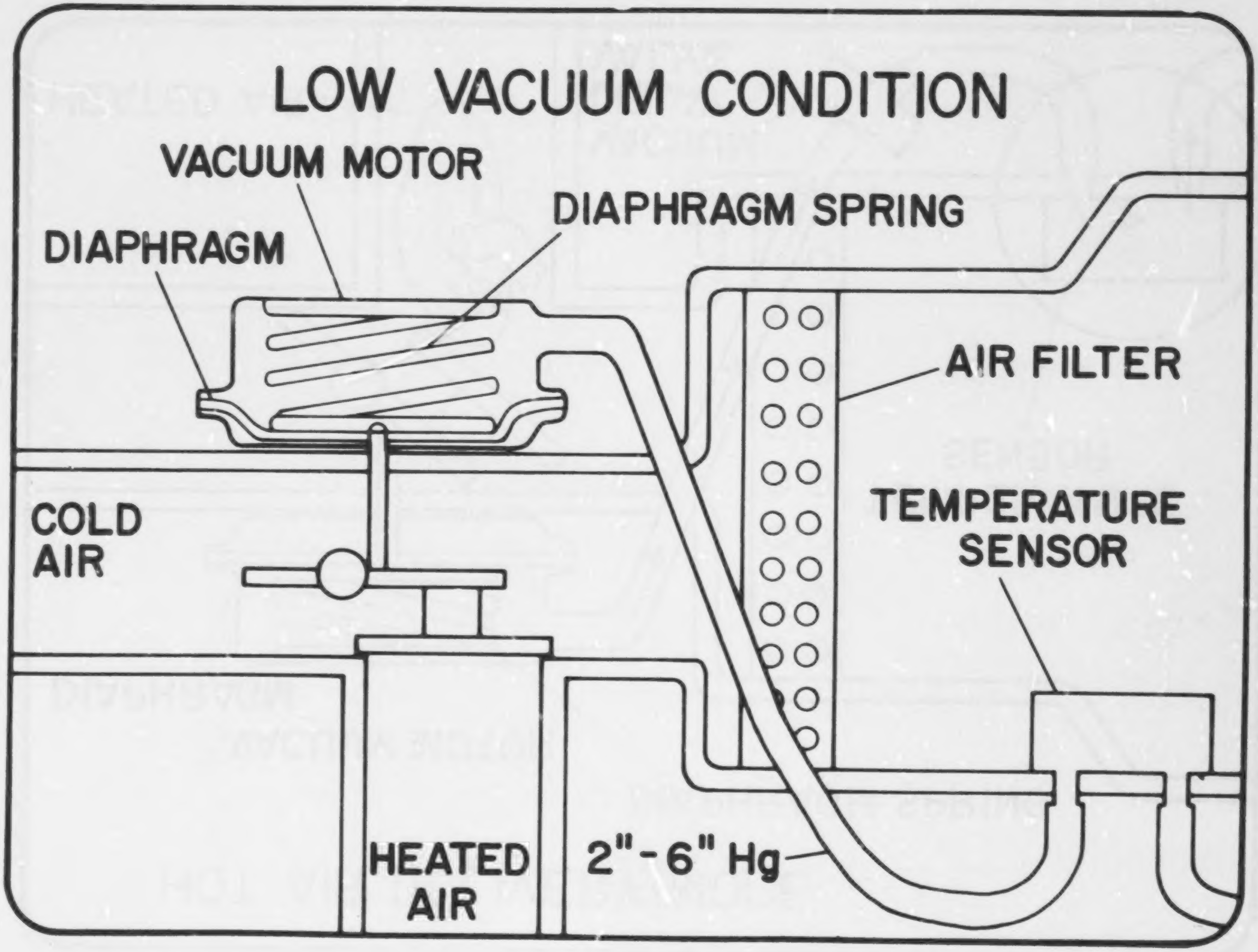
TAC. Fig. 17


AIR BLEED OPEN
TEMPERATURE SENSOR SPRING
LOW OR NO VACUUM SIGNAL TO VACUUM MOTOR
TO MANIFOLD VACUUM

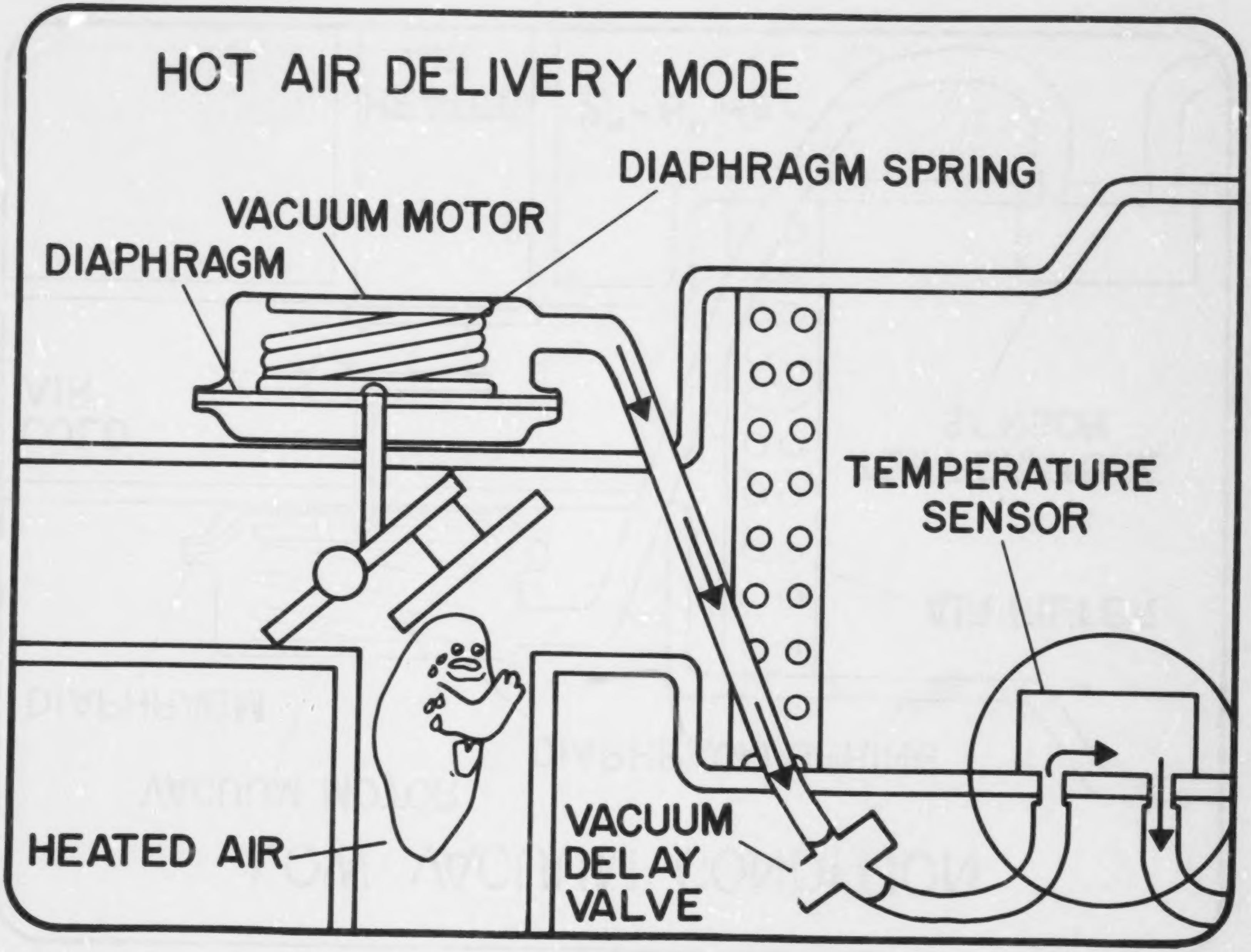
TAC. Fig. 18


COLD AIR DELIVERY MODE
DIAPHRAGM SPRING
VACUUM MOTOR
DIAPHRAGM
AIR FILTER
TEMPERATURE SENSOR
BLEEDING AIR
VEG
HEATED AIR
3"-8" Hg

TAC. Fig. 19


LOW VACUUM CONDITION
VACUUM MOTOR
DIAPHRAGM SPRING
DIAPHRAGM
AIR FILTER
COLD AIR
TEMPERATURE SENSOR
HEATED AIR
2"-6" Hg

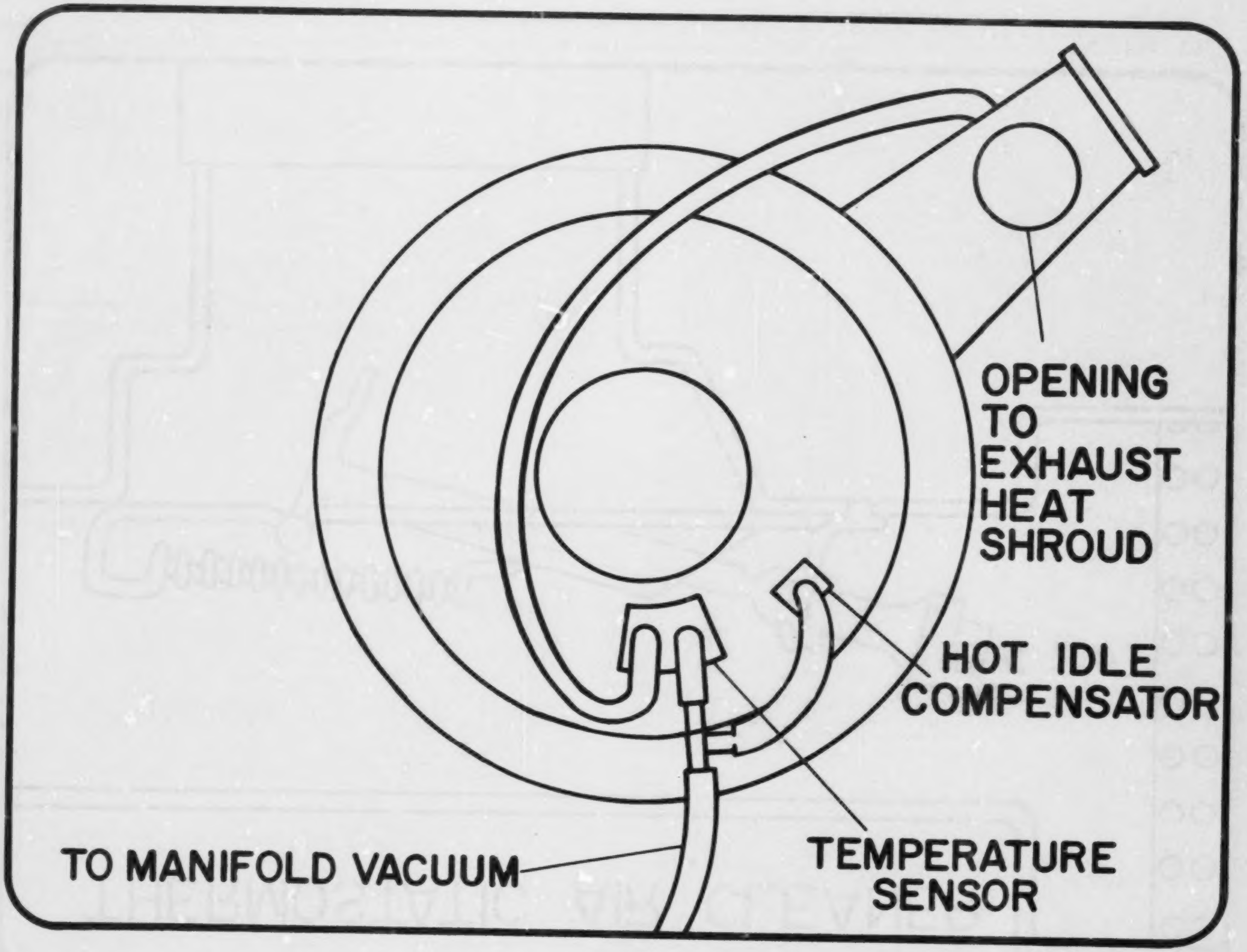
TAC. Fig. 20



HOT AIR DELIVERY MODE

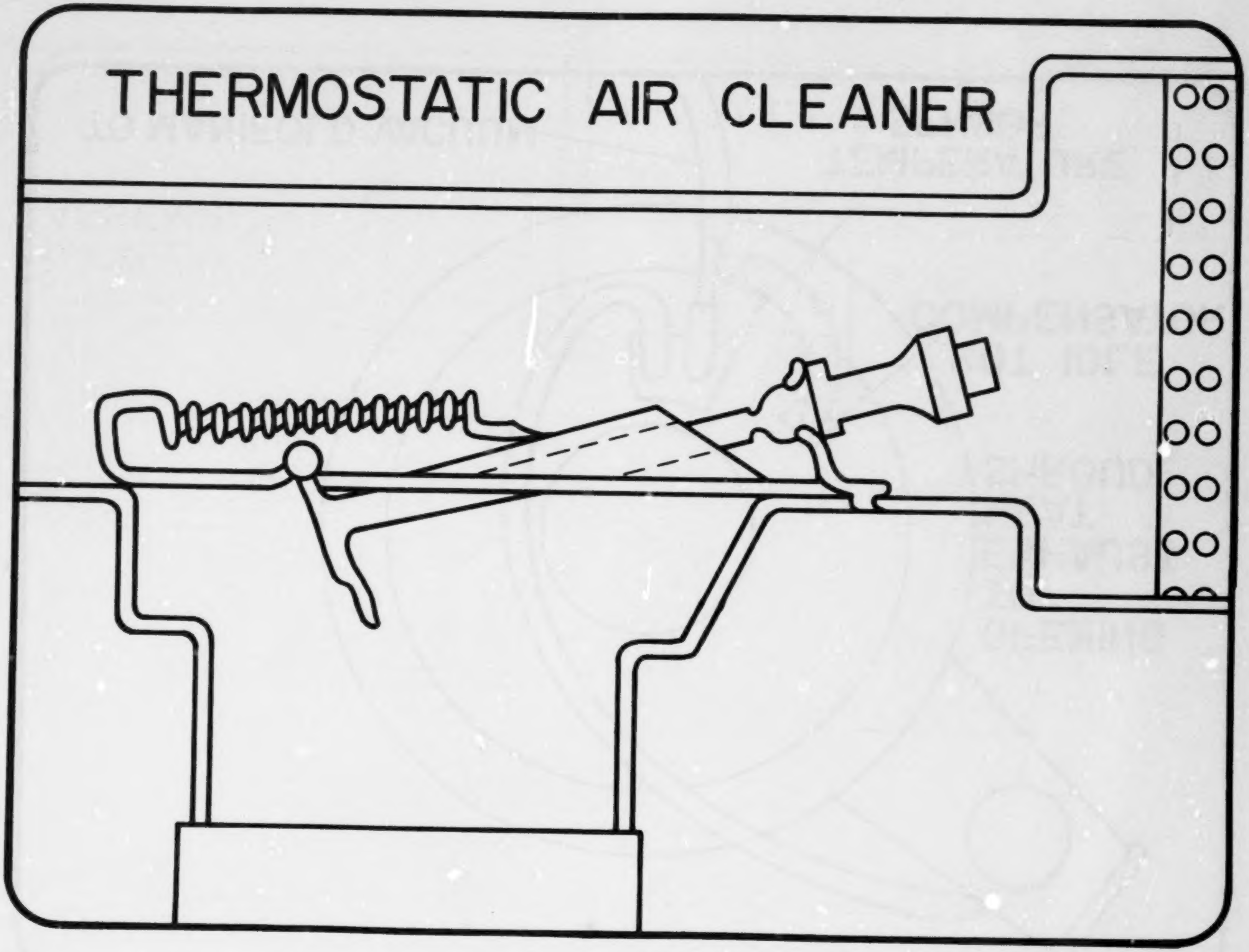
DIAPHRAGM SPRING
VACUUM MOTOR
DIAPHRAGM
TEMPERATURE SENSOR
HEATED AIR
VACUUM DELAY VALVE

TAC. Fig. 21

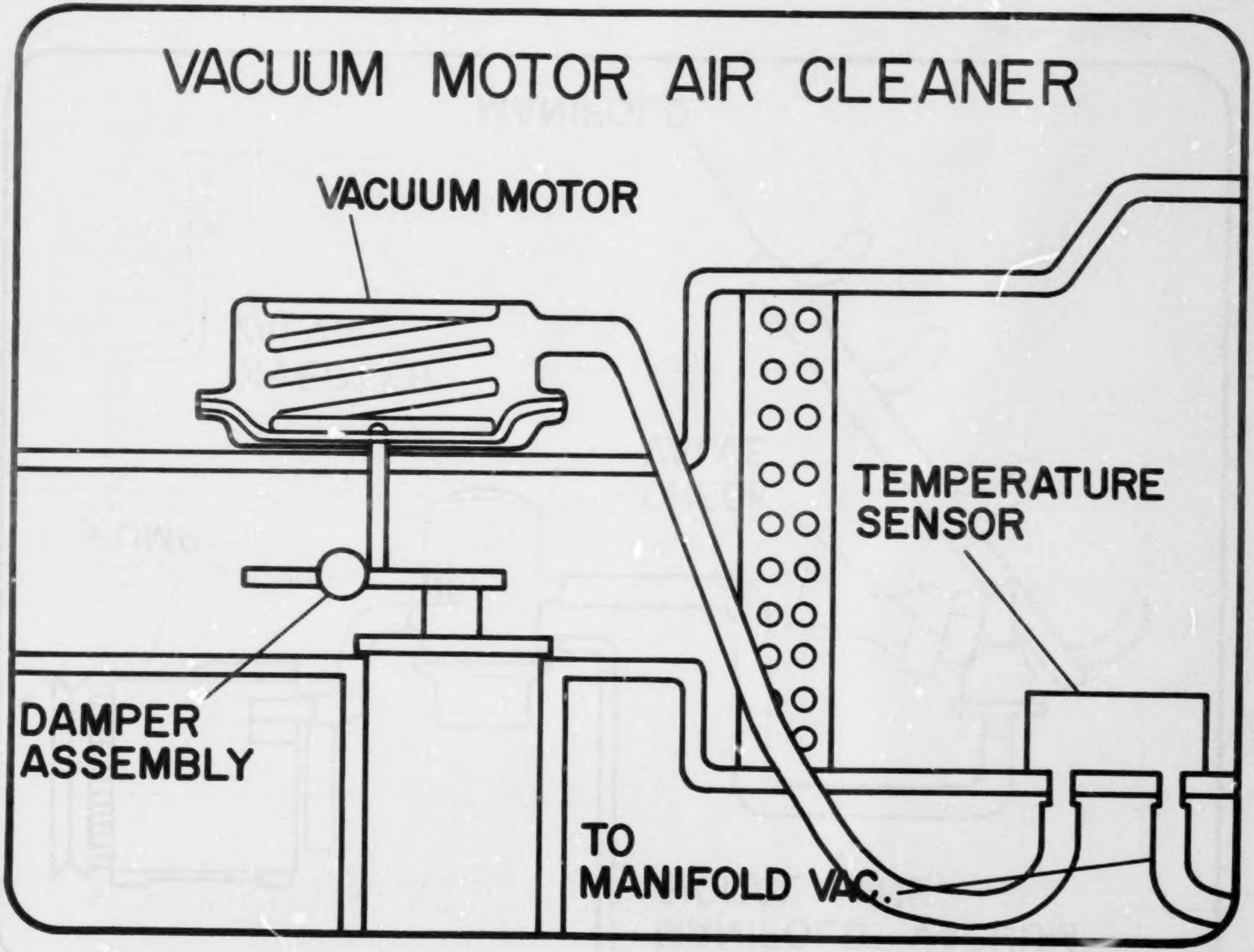

OPENING TO EXHAUST HEAT SHROUD
HOT IDLE COMPENSATOR
TO MANIFOLD VACUUM
TEMPERATURE SENSOR

TAC. Fig. 22

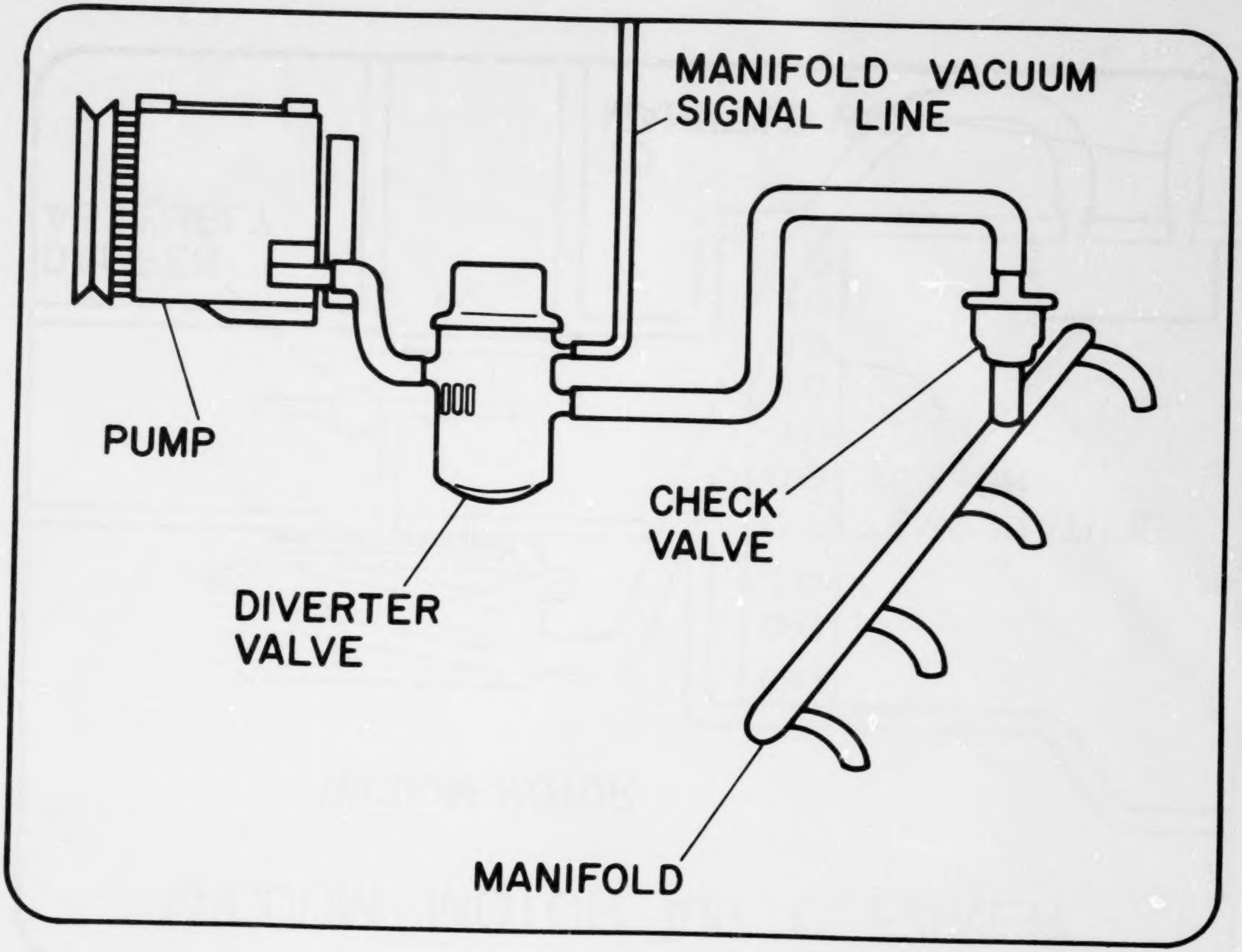
THERMOSTATIC AIR CLEANER



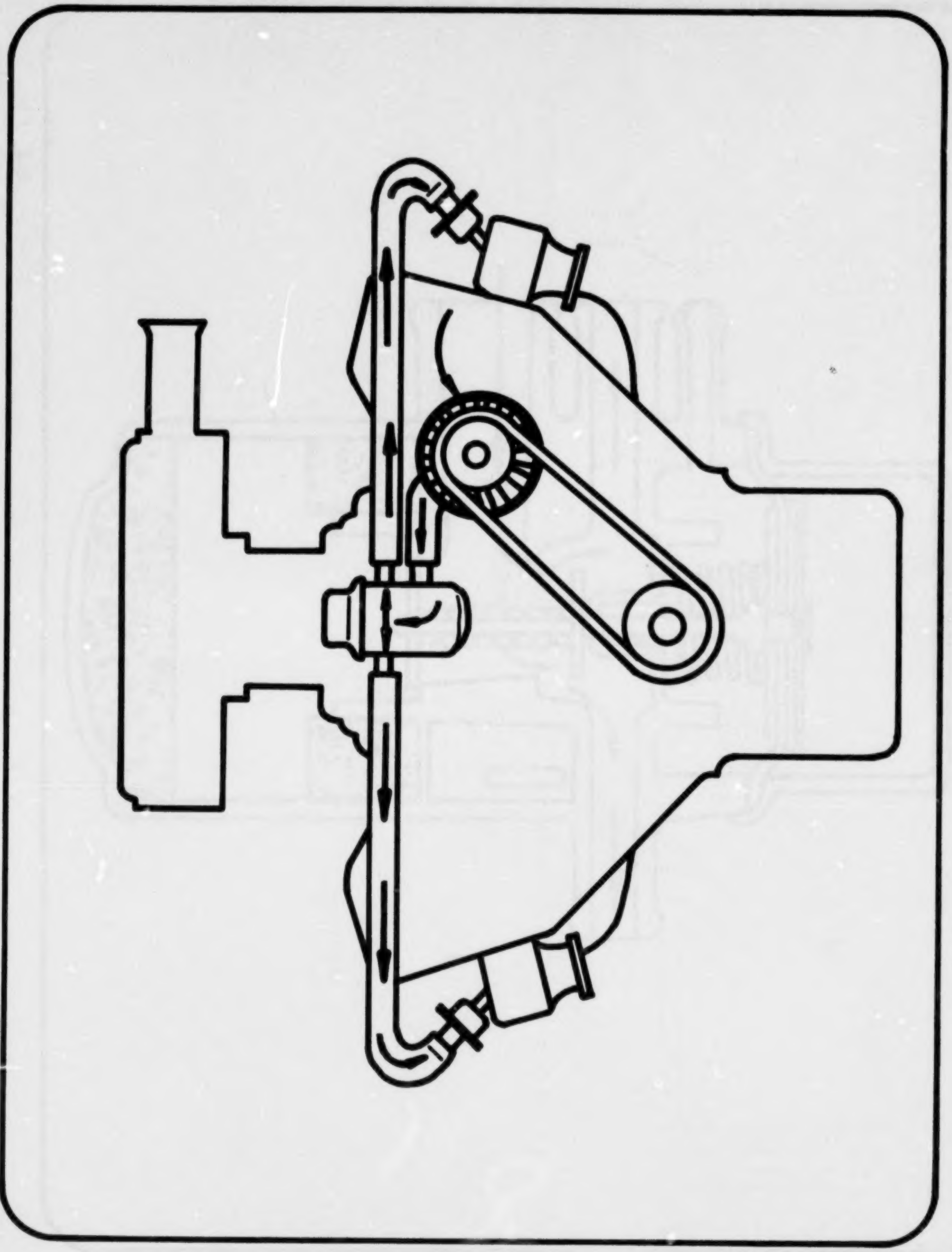
TAC. Fig. 23


VACUUM MOTOR AIR CLEANER
VACUUM MOTOR
TEMPERATURE SENSOR
DAMPER ASSEMBLY
TO MANIFOLD VAC.

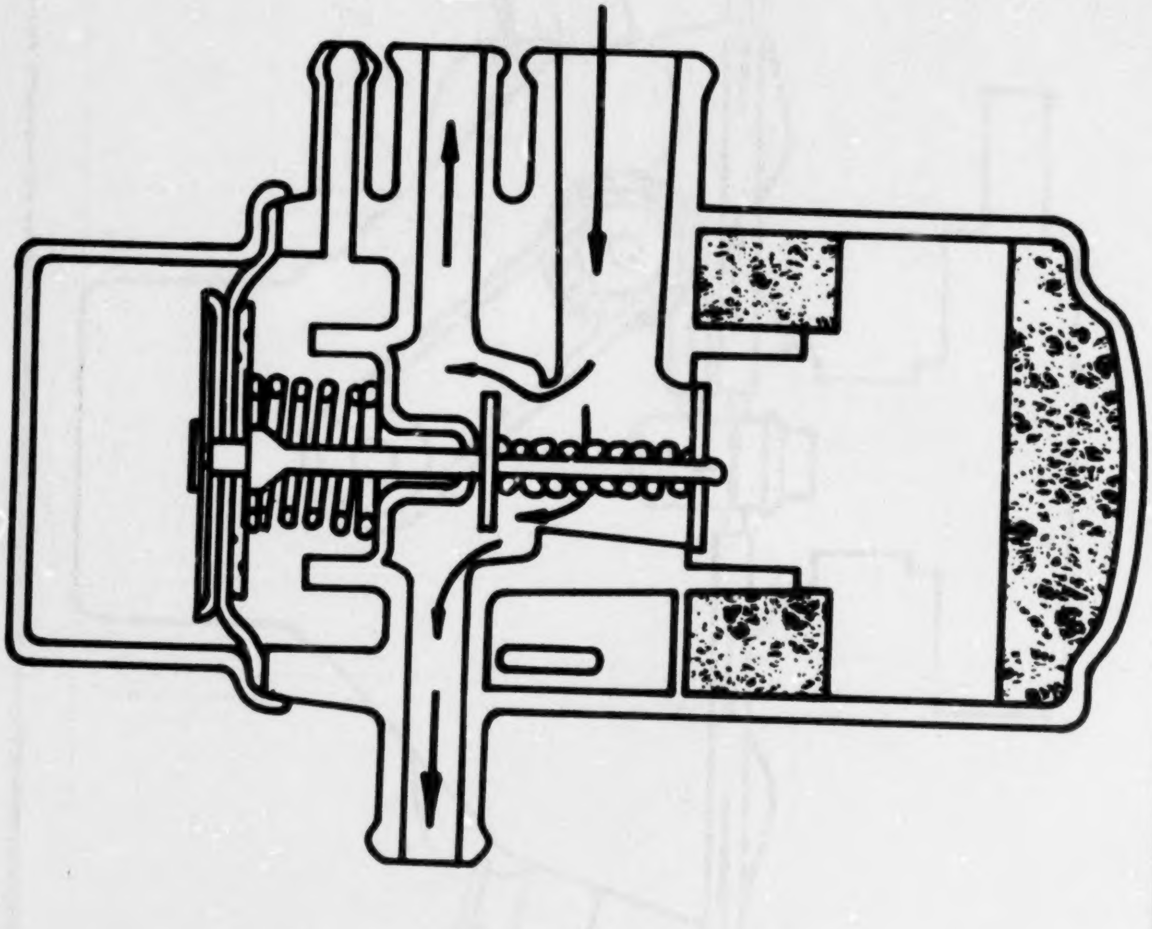
TAC. Fig. 24


MANIFOLD VACUUM
SIGNAL LINE
PUMP
CHECK
VALVE
DIVERTER
VALVE
MANIFOLD

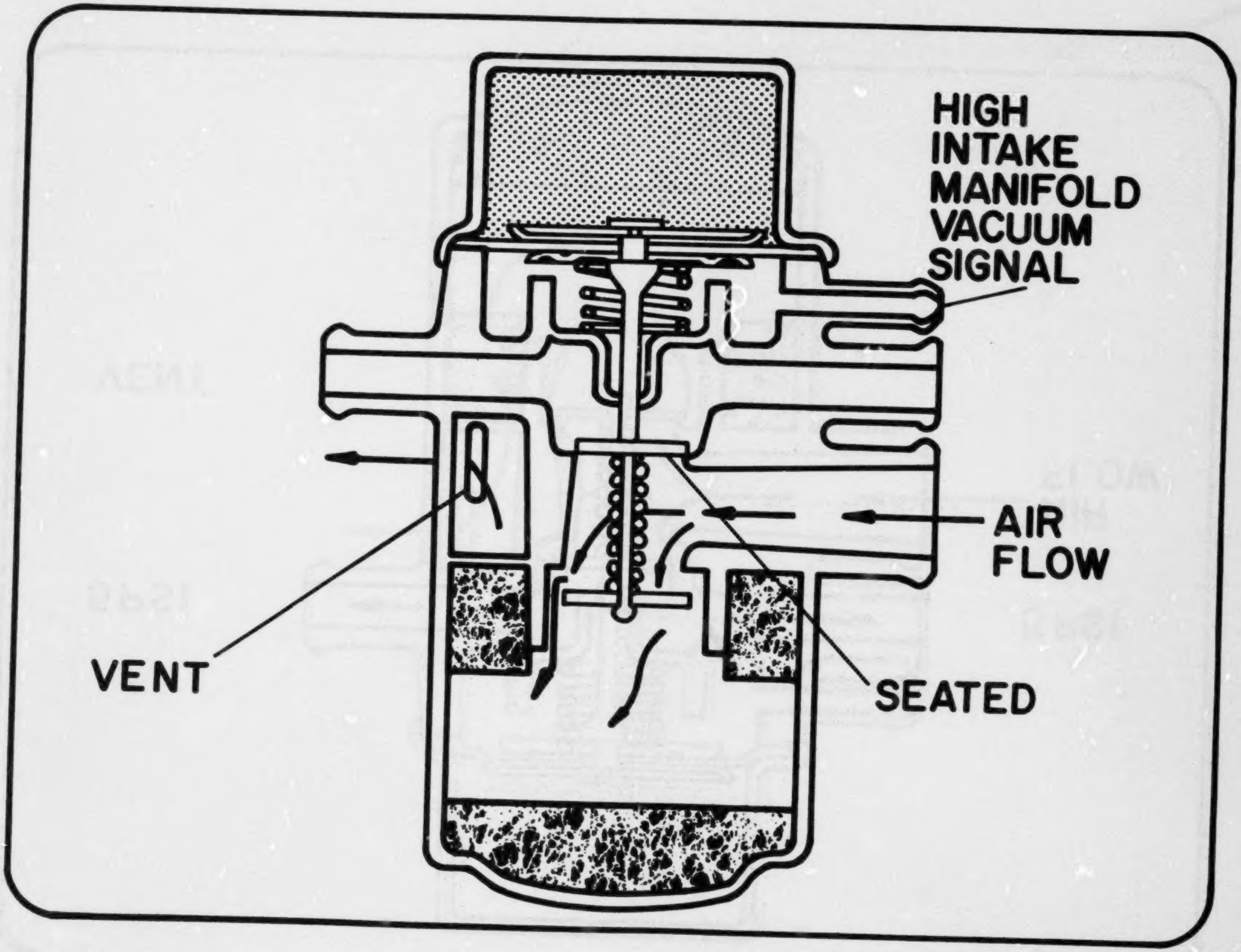
AIR. Fig. 1



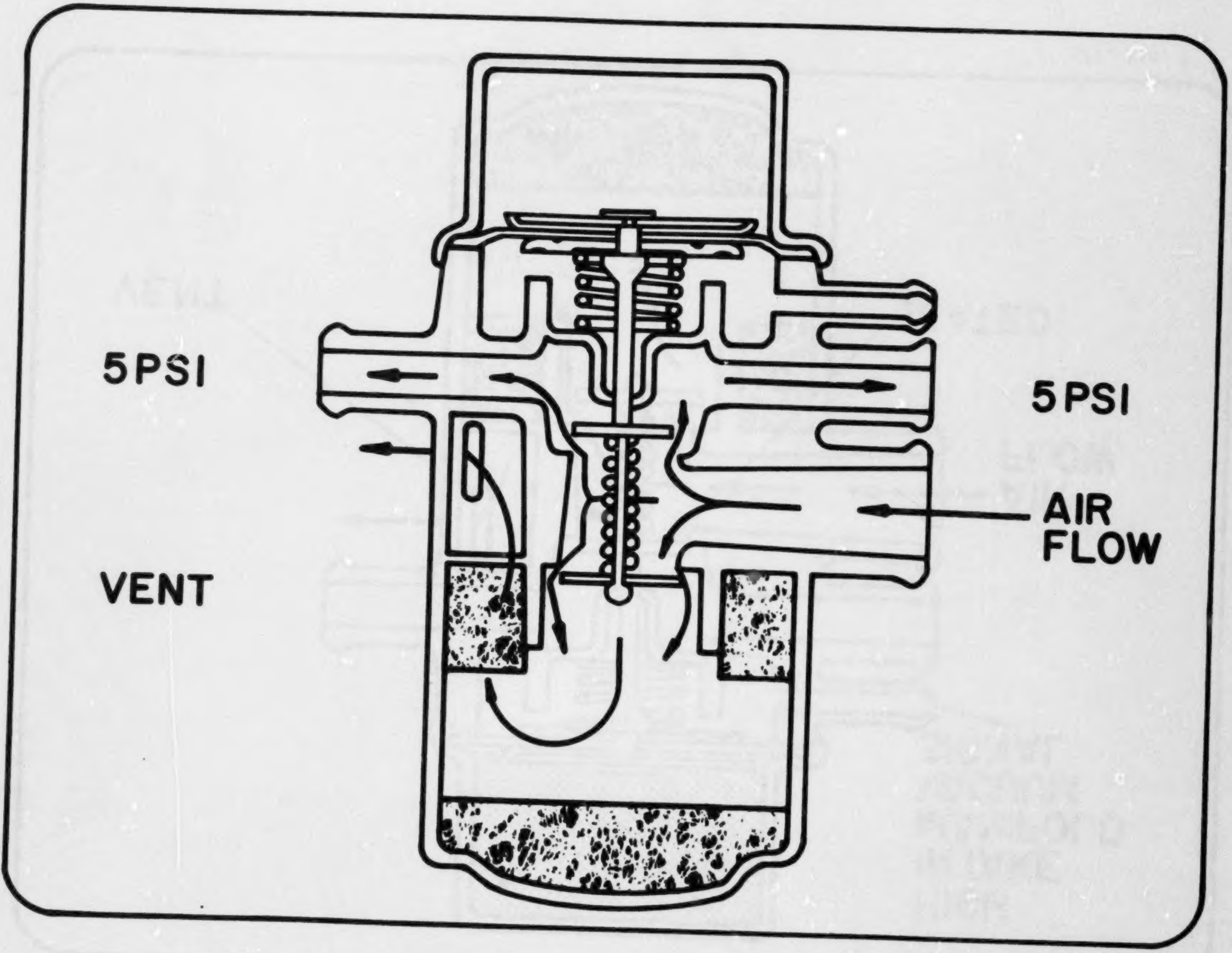
AIR. Fig. 2



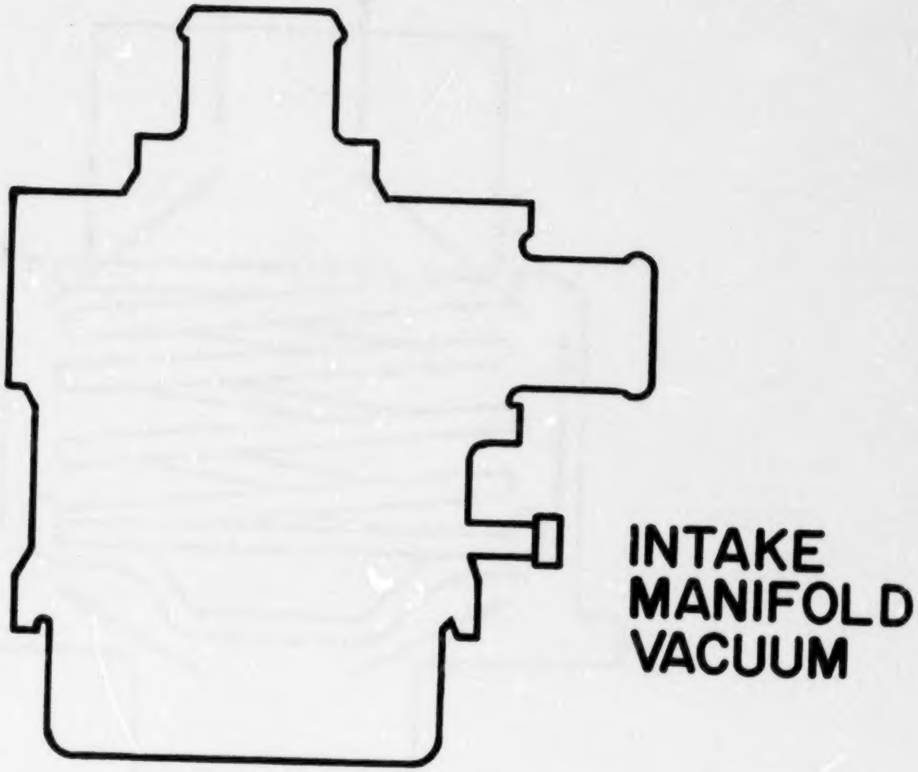
AIR. Fig. 3


HIGH INTAKE MANIFOLD VACUUM SIGNAL
AIR FLOW
VENT
SEATED

AIR. Fig. 4

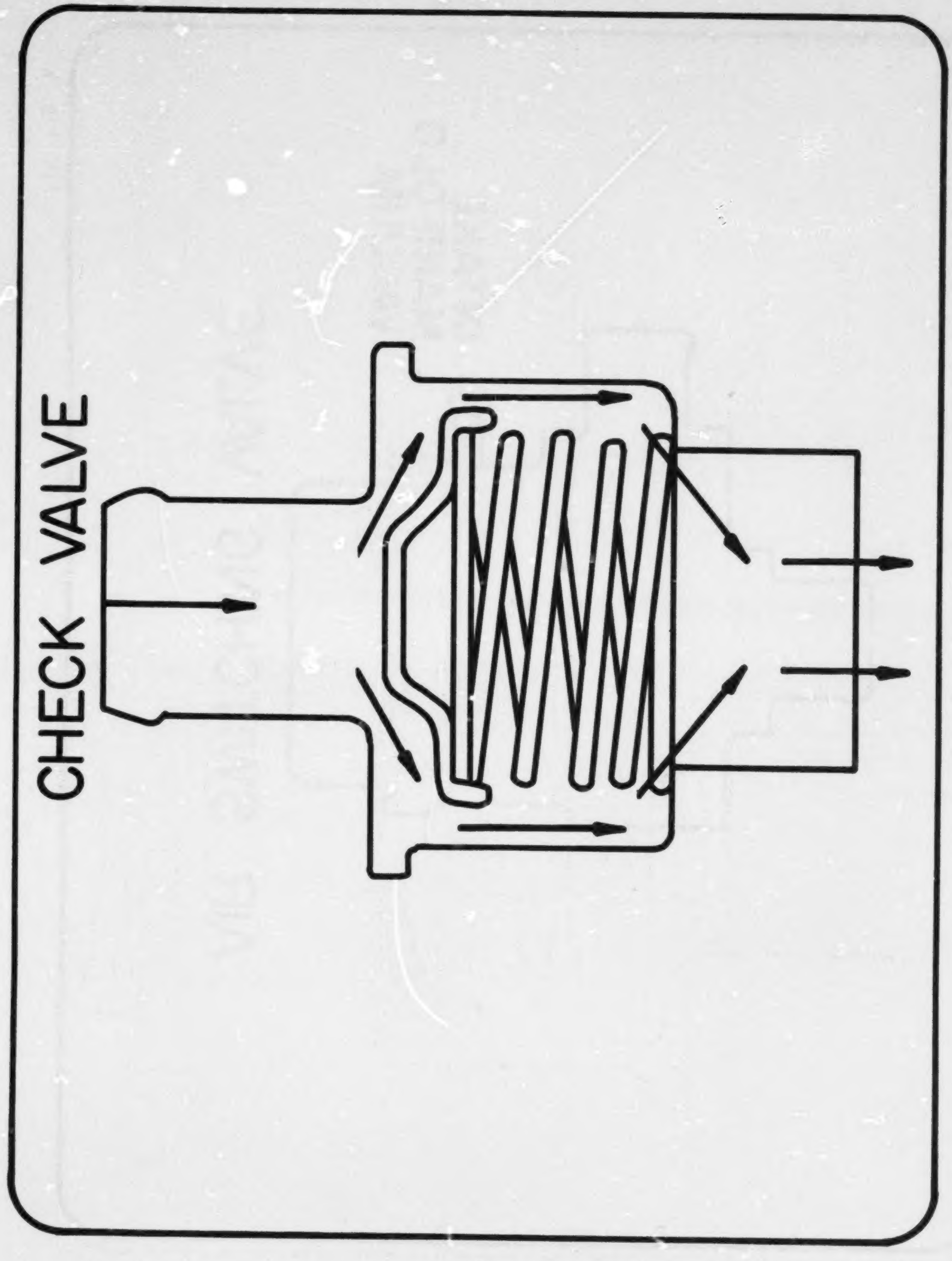

5PSI
5PSI
AIR FLOW
VENT

AIR. Fig. 5

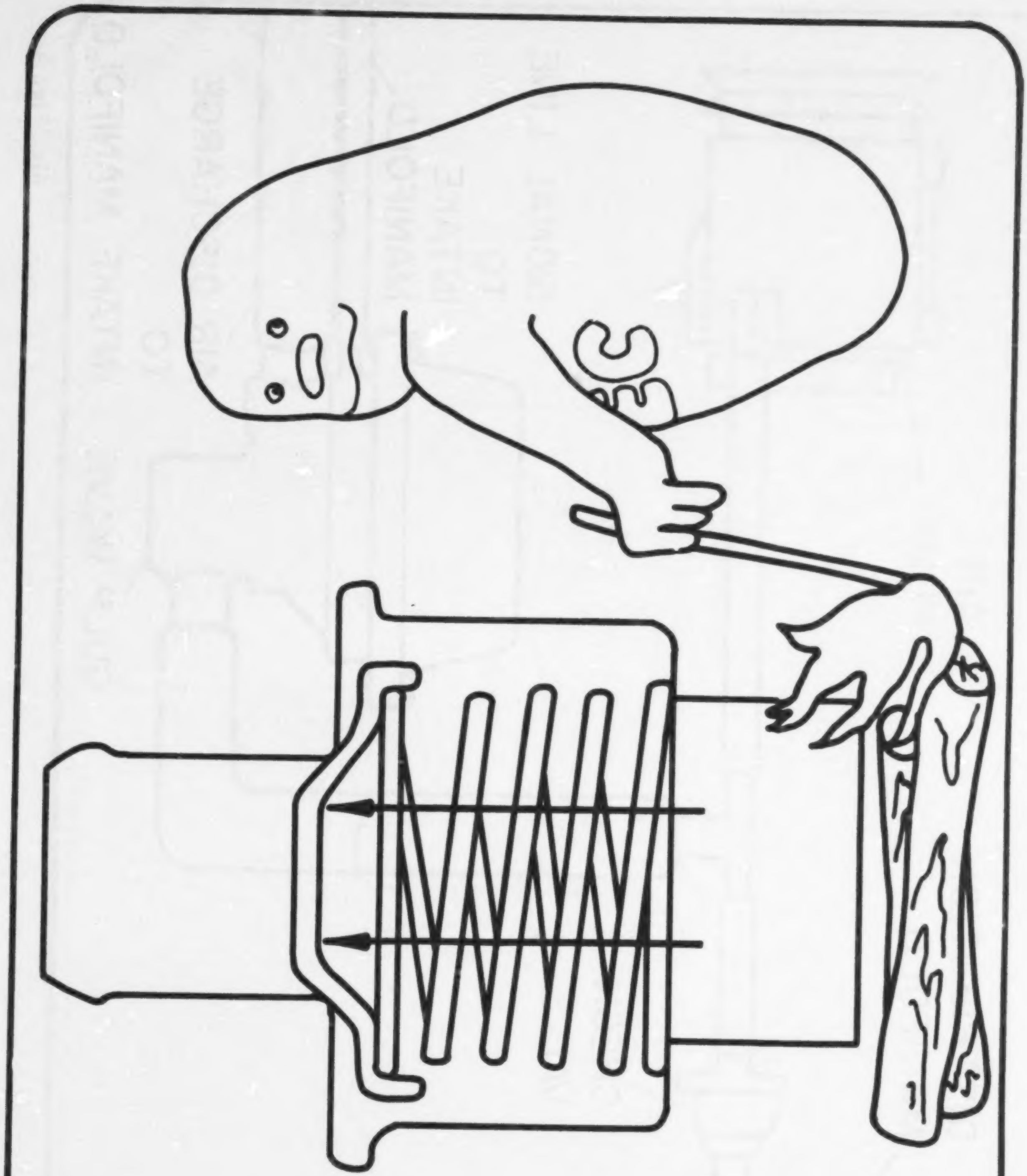

INTAKE
MANIFOLD
VACUUM

AIR SWITCHING VALVE

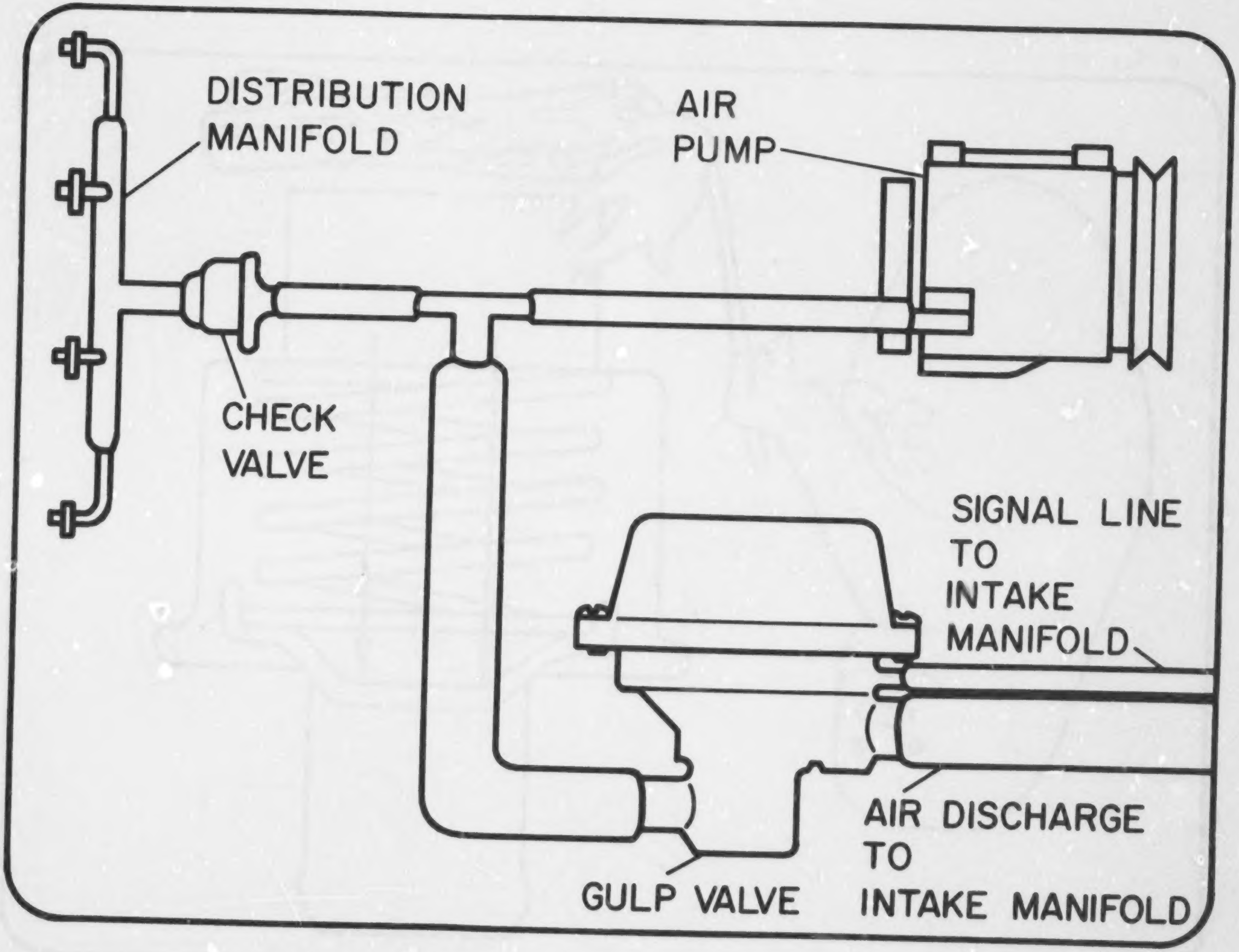
AIR. Fig. 6


CHECK VALVE

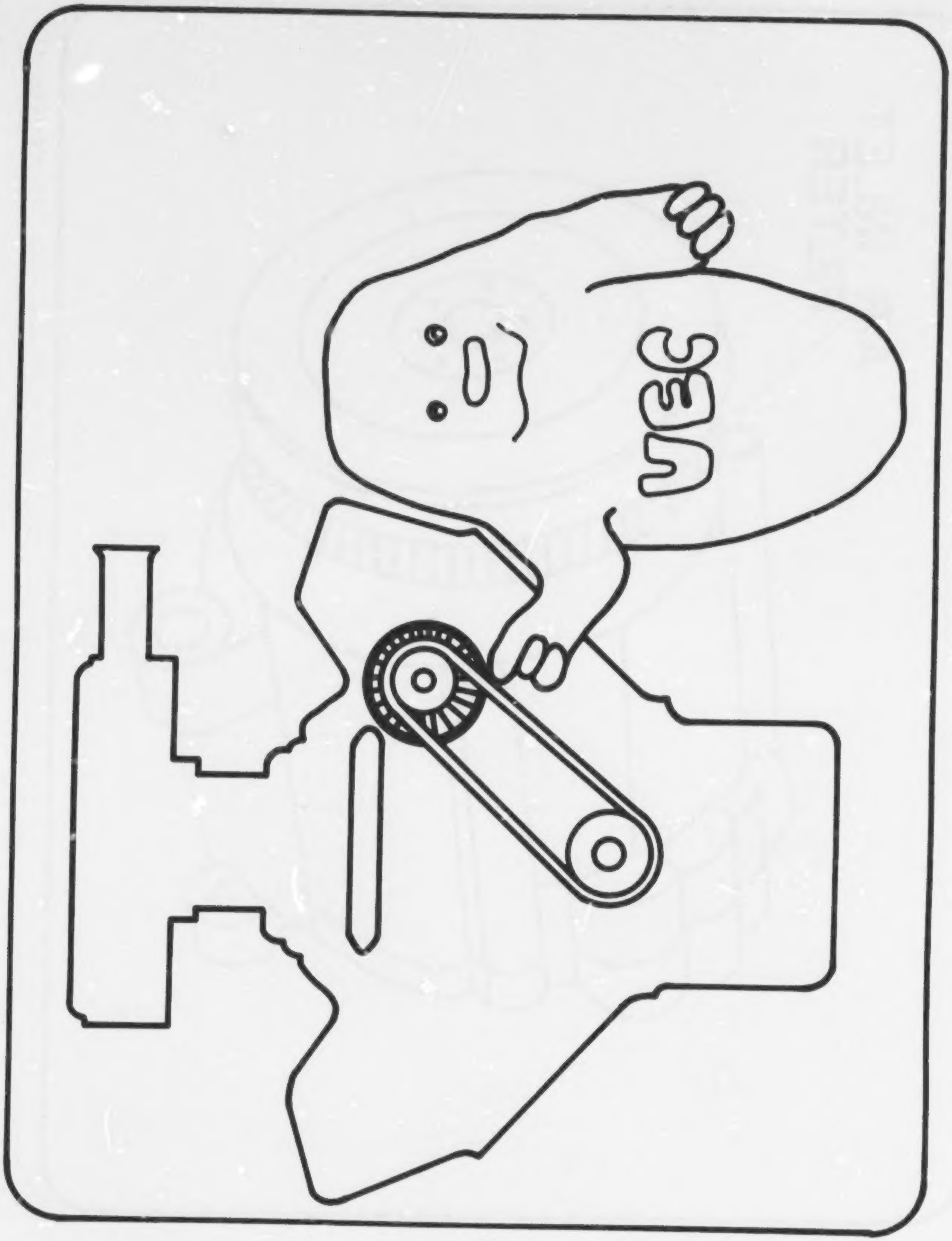
AIR. Fig. 7



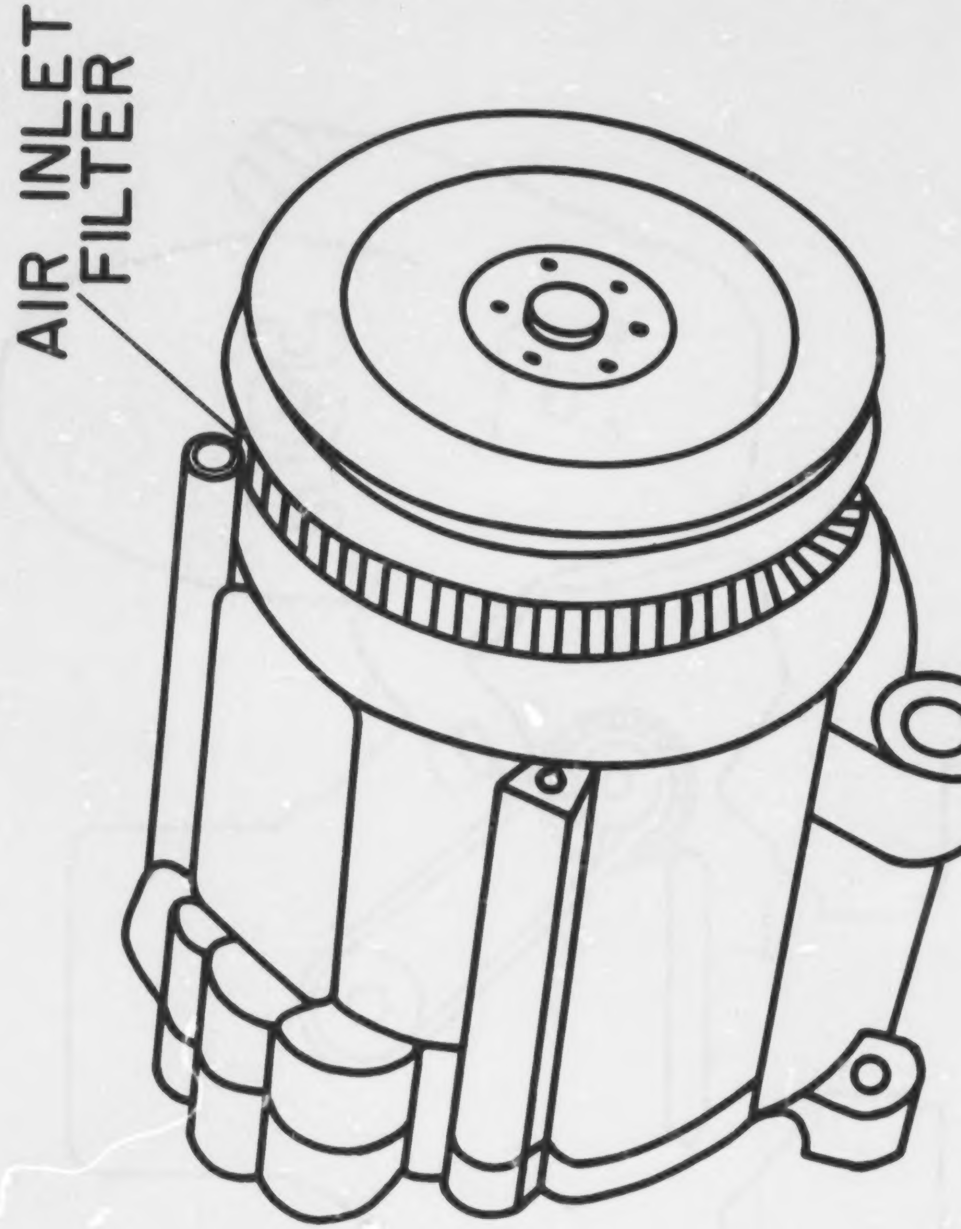
AIR. Fig. 8


DISTRIBUTION MANIFOLD
AIR PUMP
CHECK VALVE
SIGNAL LINE TO INTAKE MANIFOLD
AIR DISCHARGE TO INTAKE MANIFOLD
GULP VALVE

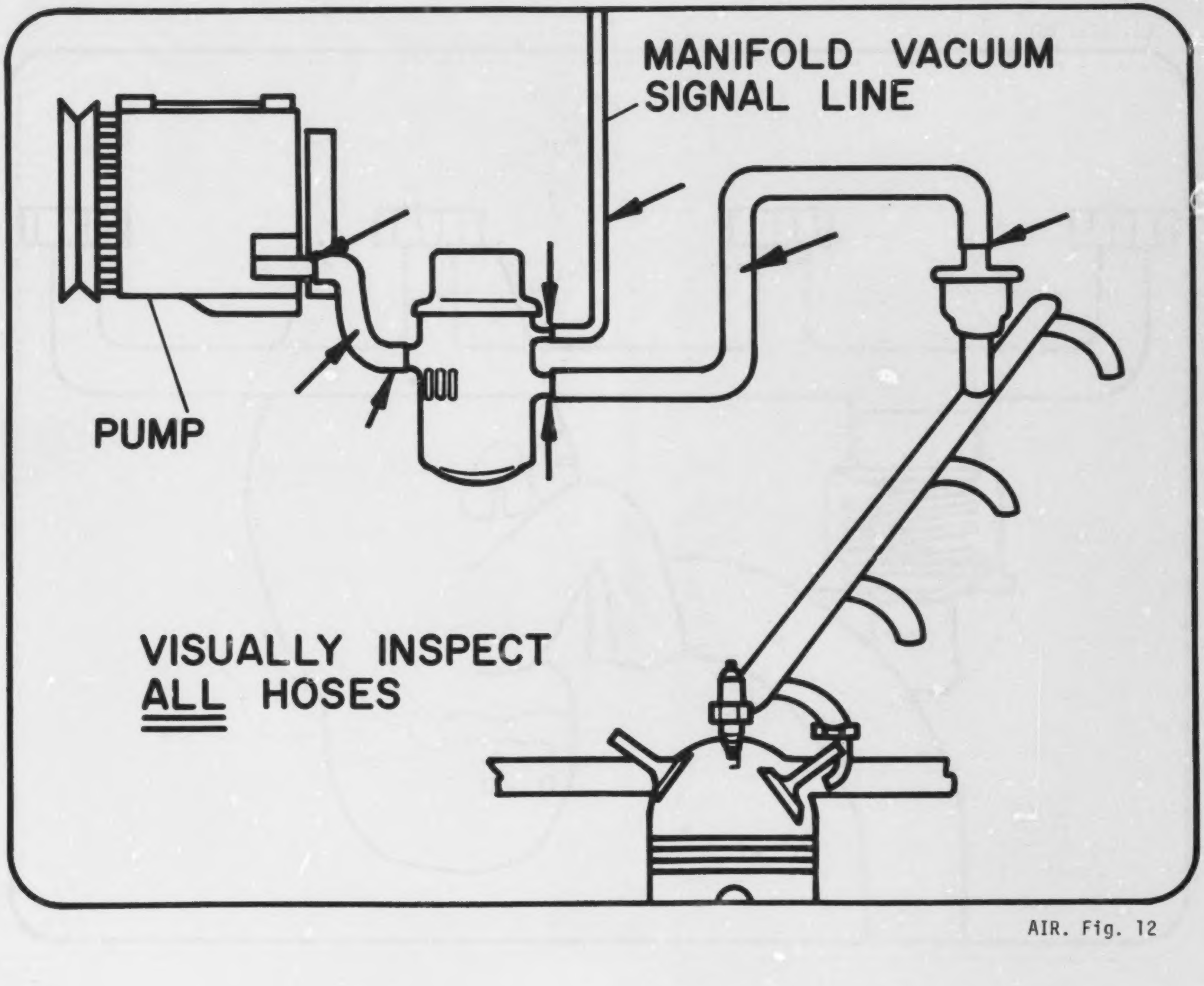
AIR. Fig. 9



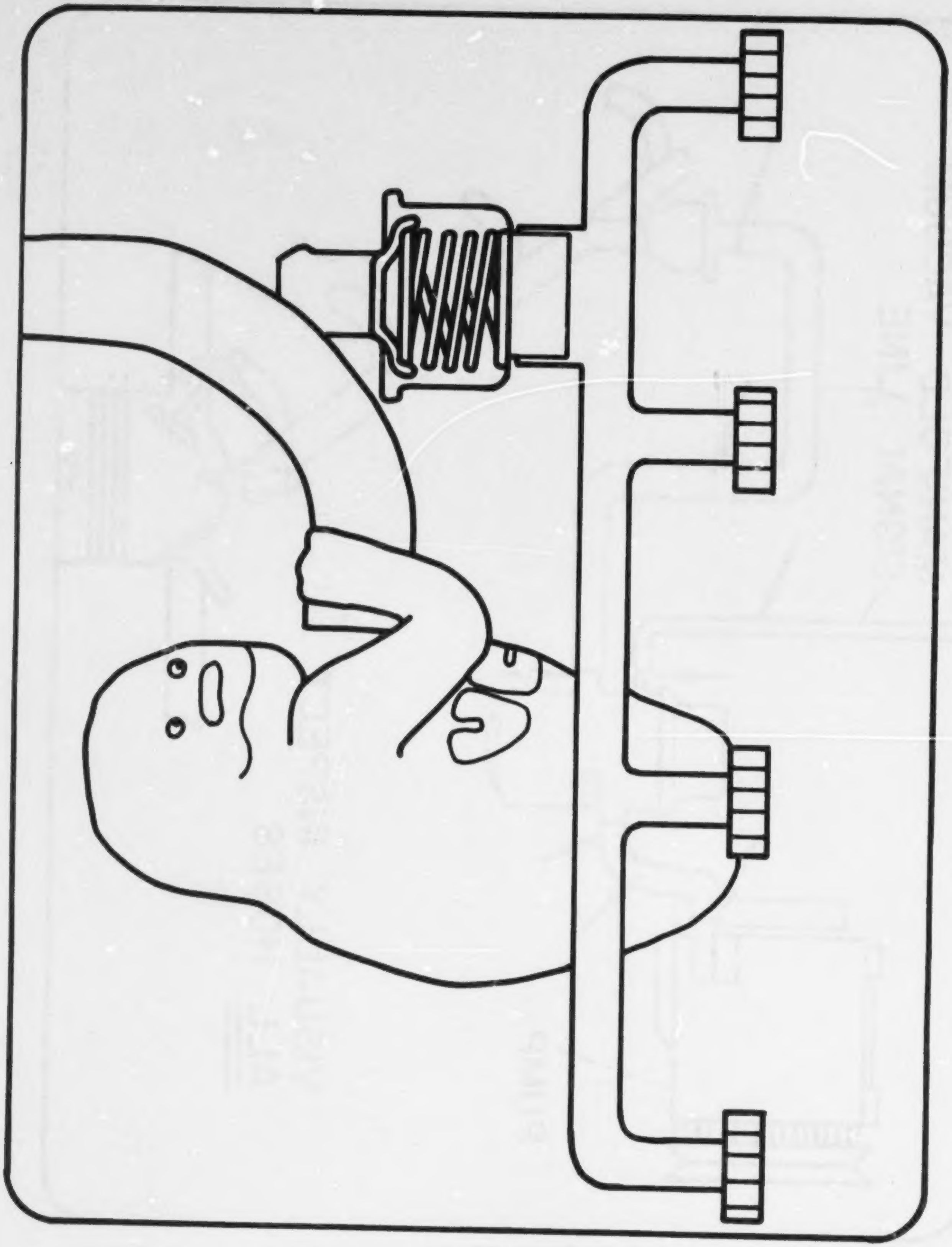
AIR. Fig. 10


AIR INLET FILTER

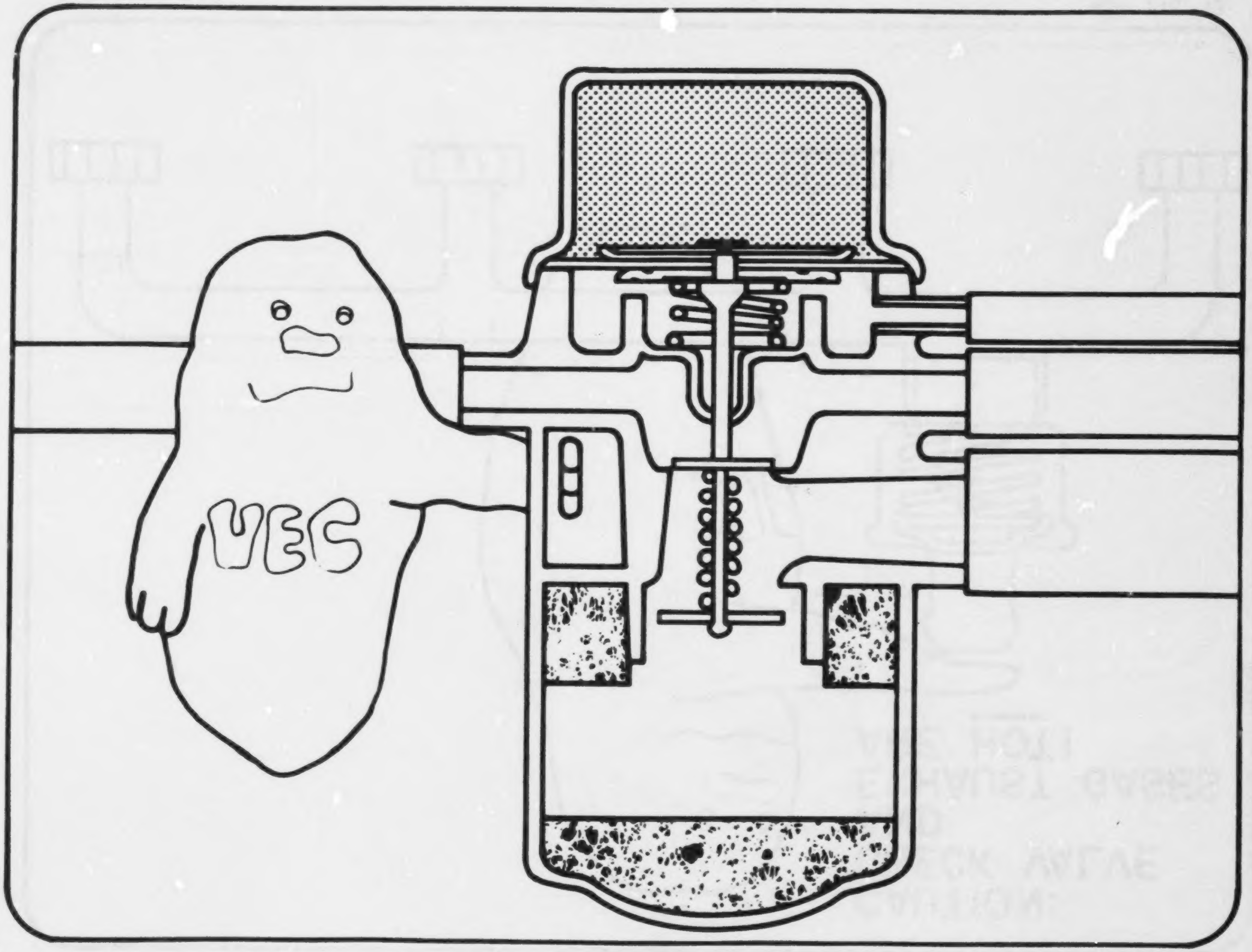
AIR. Fig. 11


MANIFOLD VACUUM
SIGNAL LINE
PUMP
VISUALLY INSPECT
ALL HOSES

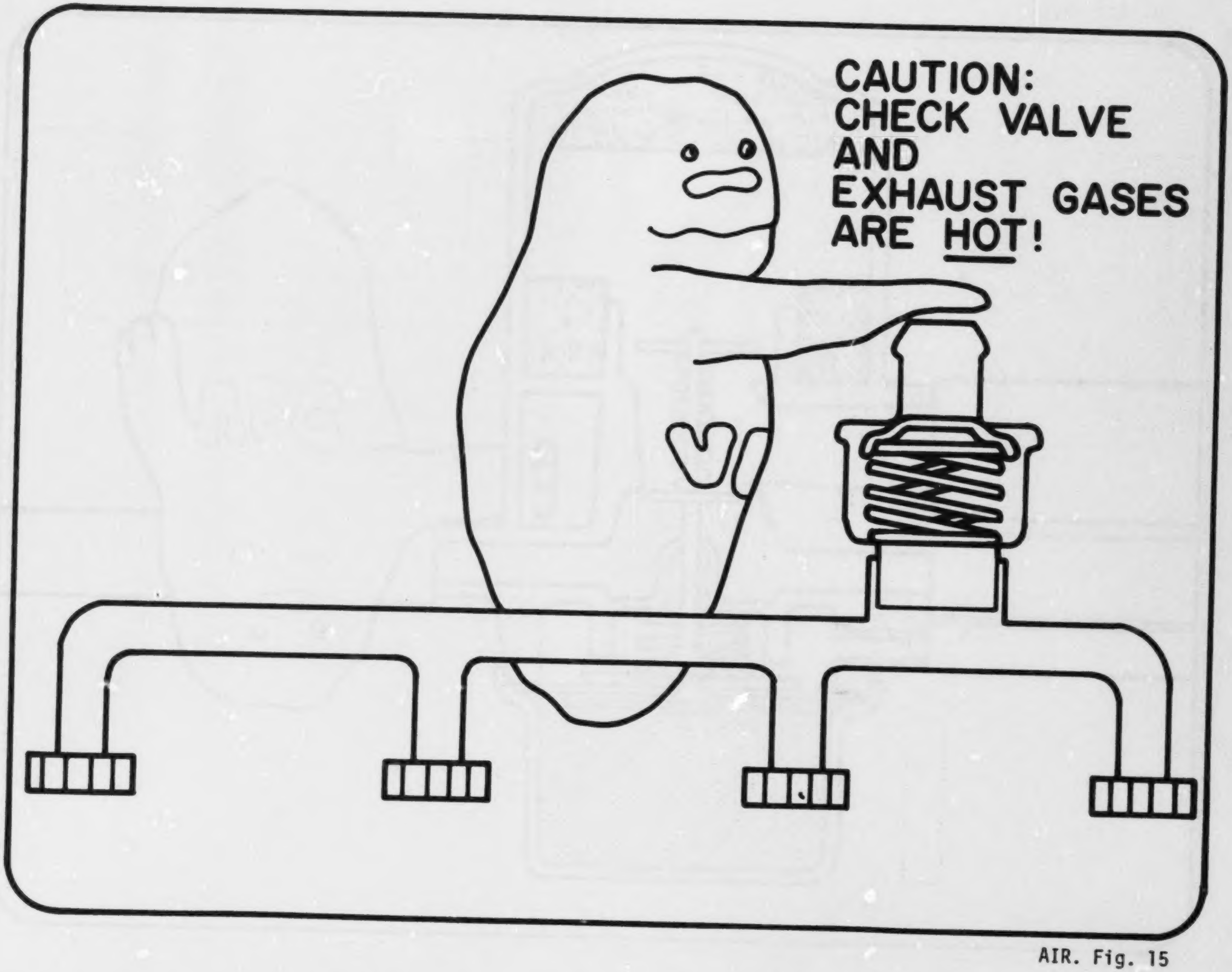
AIR. Fig. 12



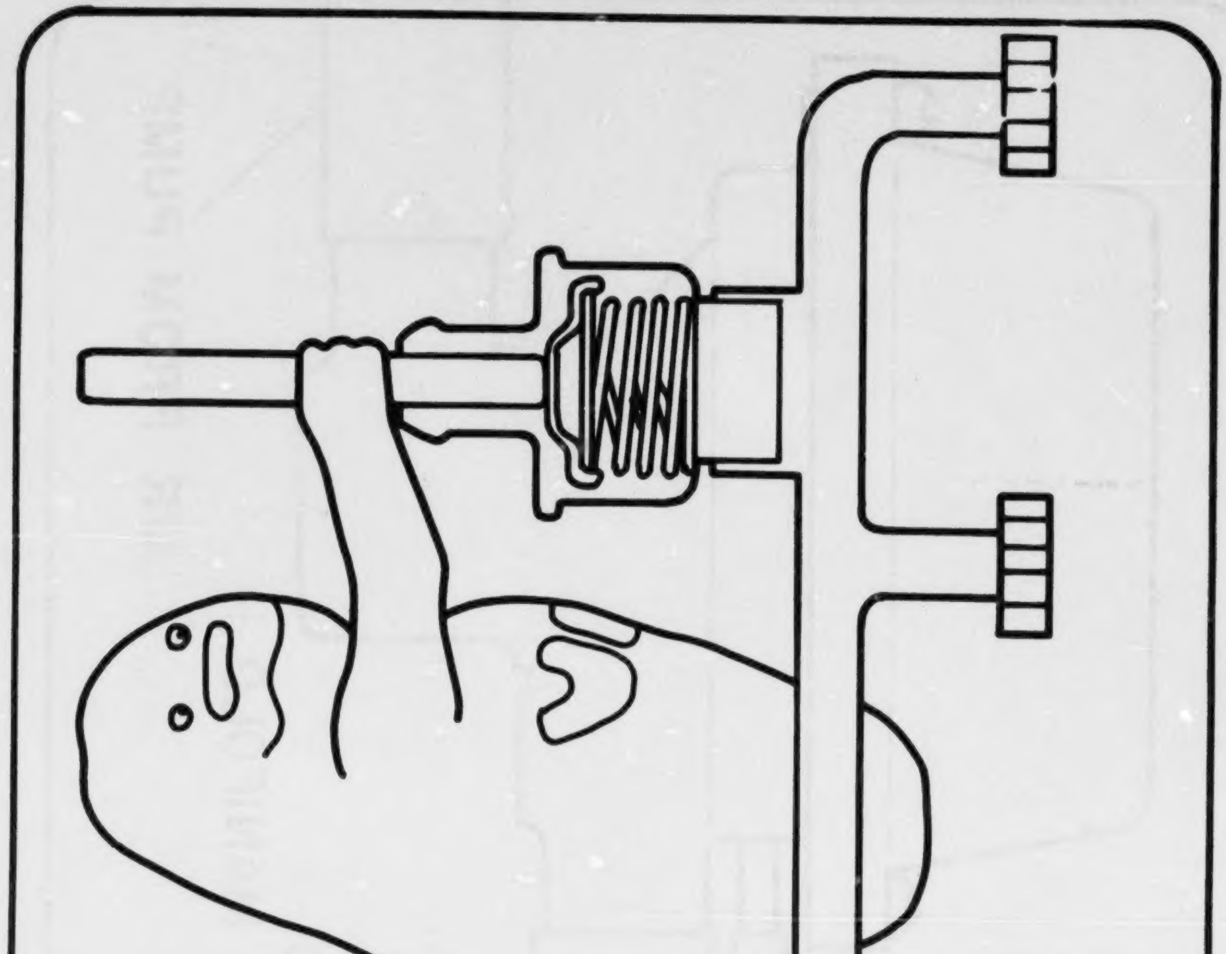
AIR. Fig. 13



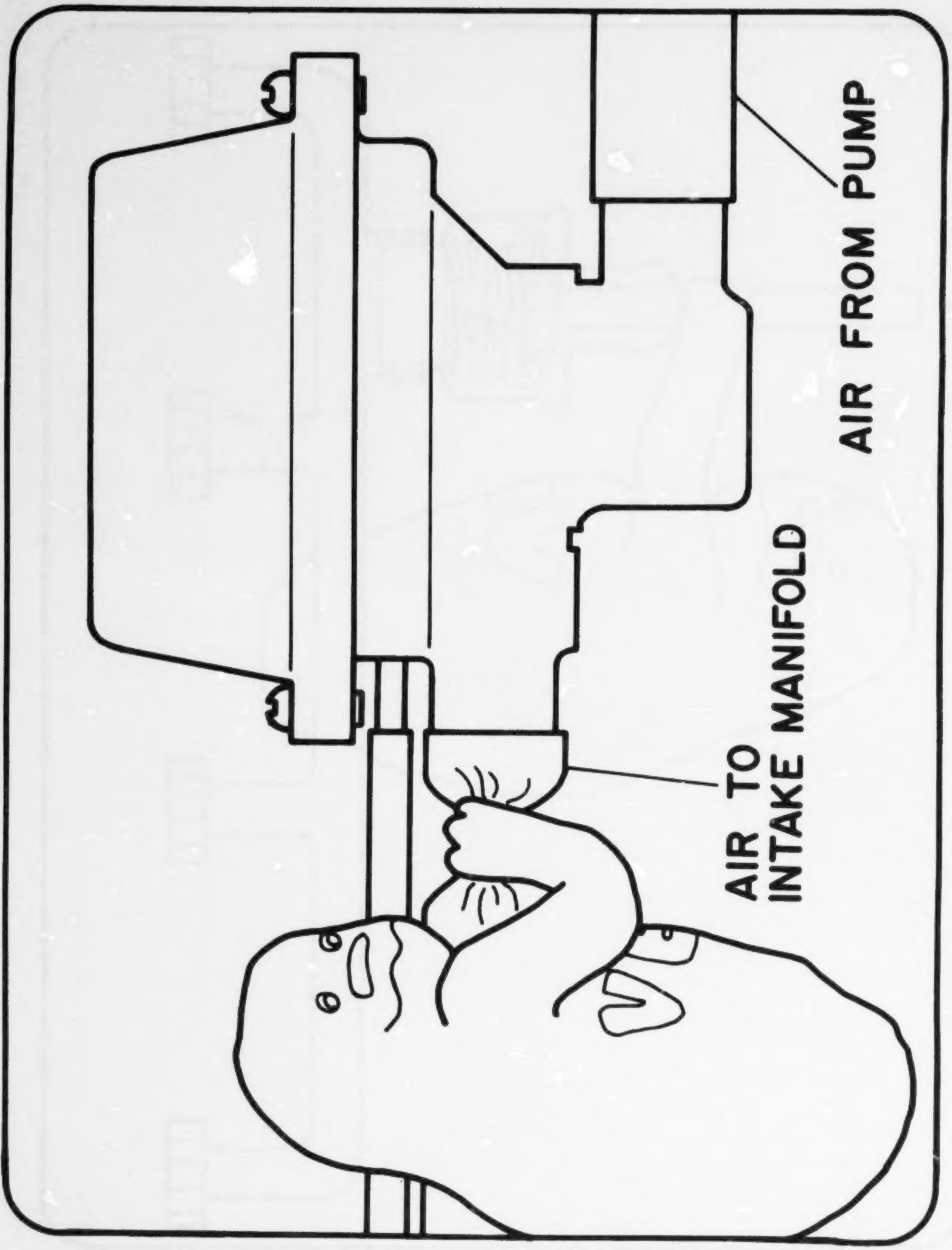
AIR. Fig. 14


CAUTION:
CHECK VALVE
AND
EXHAUST GASES
ARE HOT!

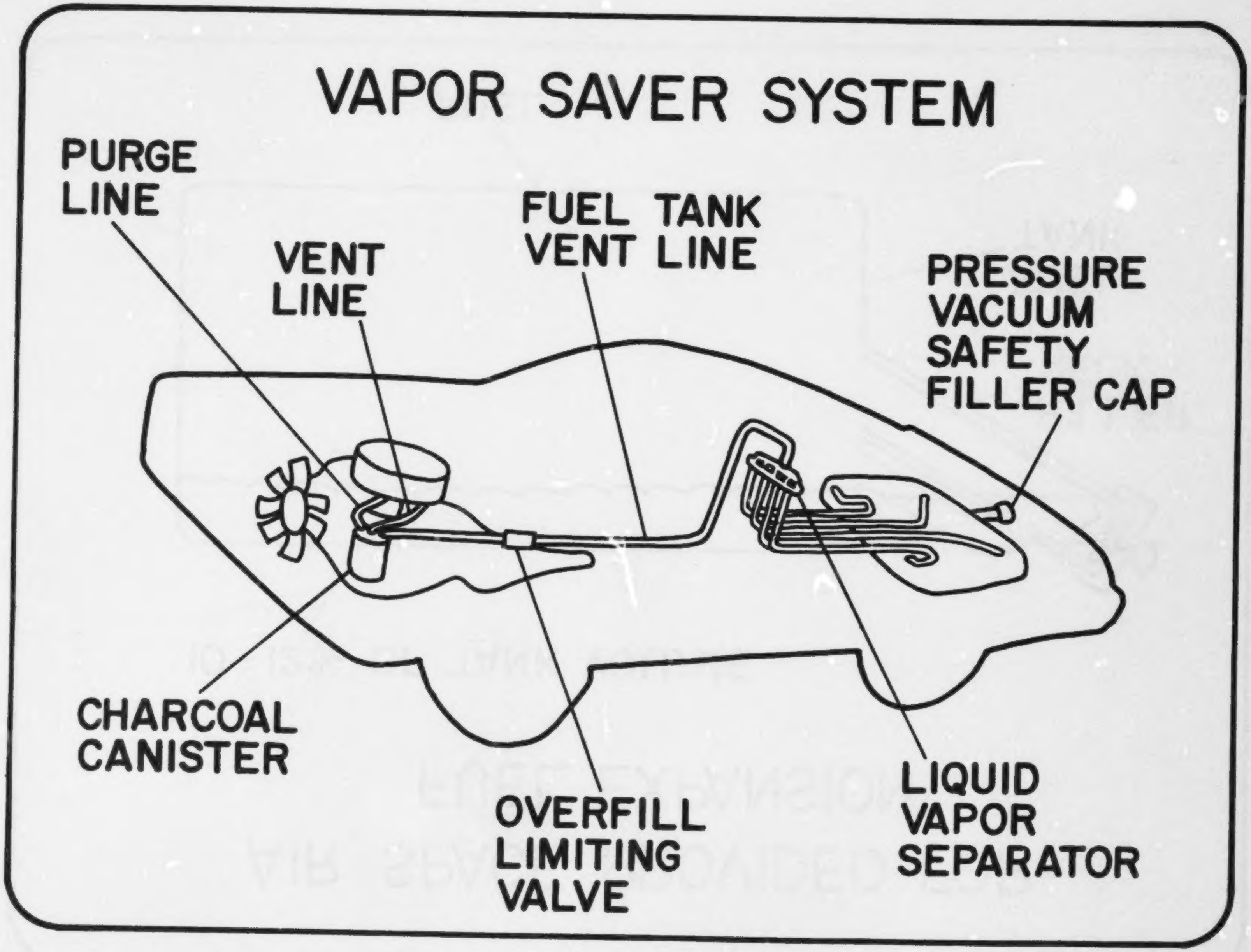
AIR. Fig. 15



AIR. Fig. 16

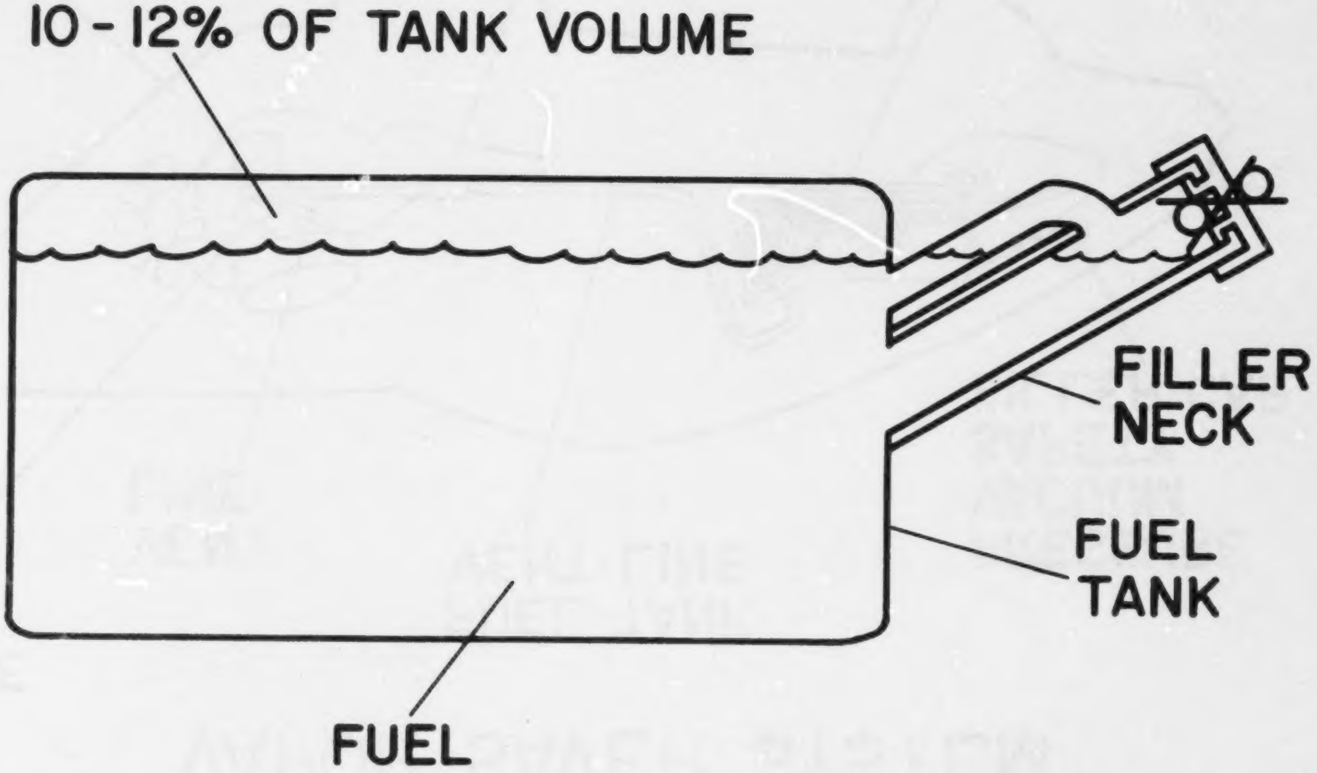

AIR FROM PUMP
AIR TO INTAKE MANIFOLD

AIR. Fig. 17


VAPOR SAVER SYSTEM
PURGE LINE
VENT LINE
FUEL TANK VENT LINE
PRESSURE VACUUM SAFETY FILLER CAP
CHARCOAL CANISTER
OVERFILL LIMITING VALVE
LIQUID VAPOR SEPARATOR

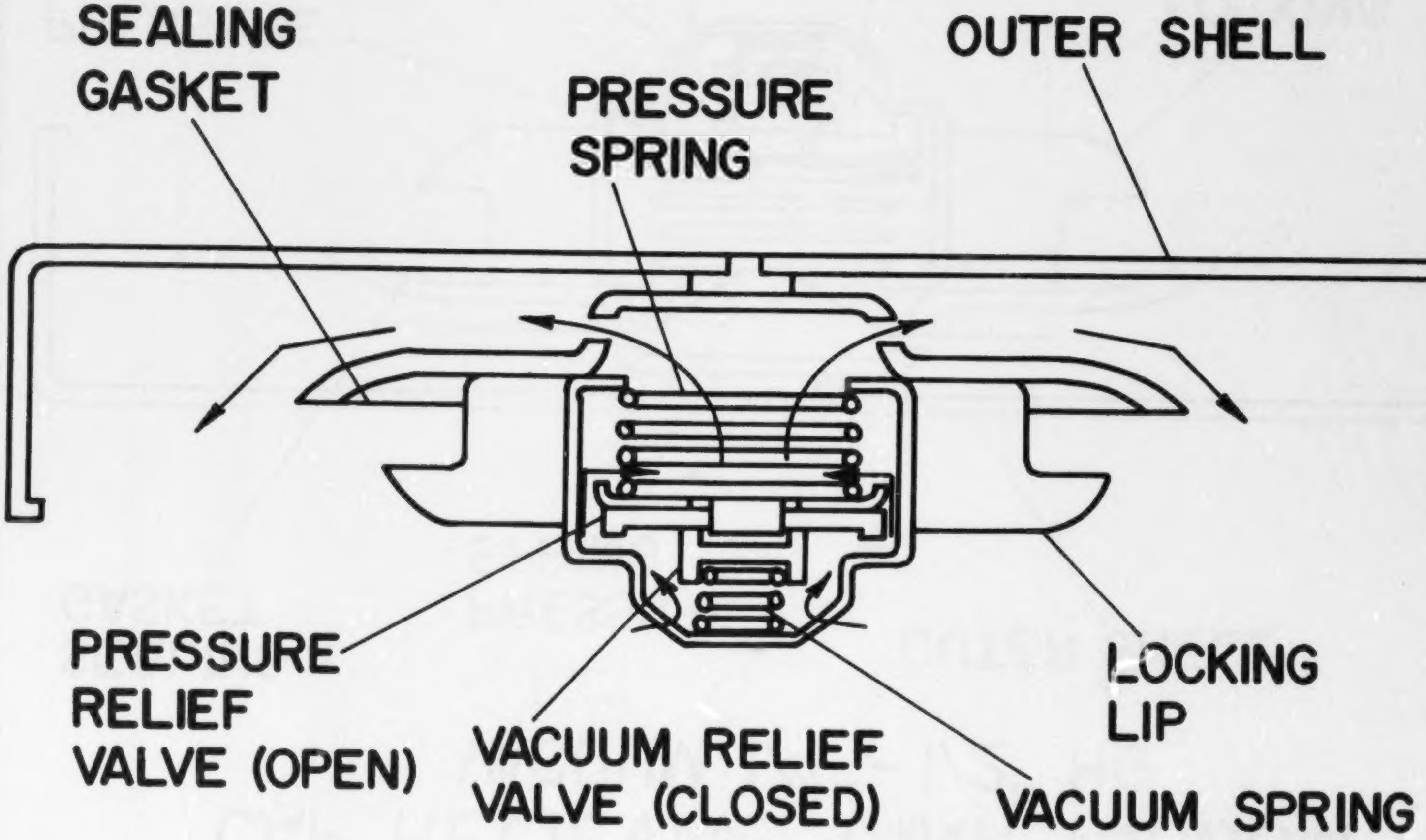
FEC. Fig. 1

AIR SPACE PROVIDED FOR FUEL EXPANSION


10-12% OF TANK VOLUME
FILLER NECK
FUEL TANK
FUEL

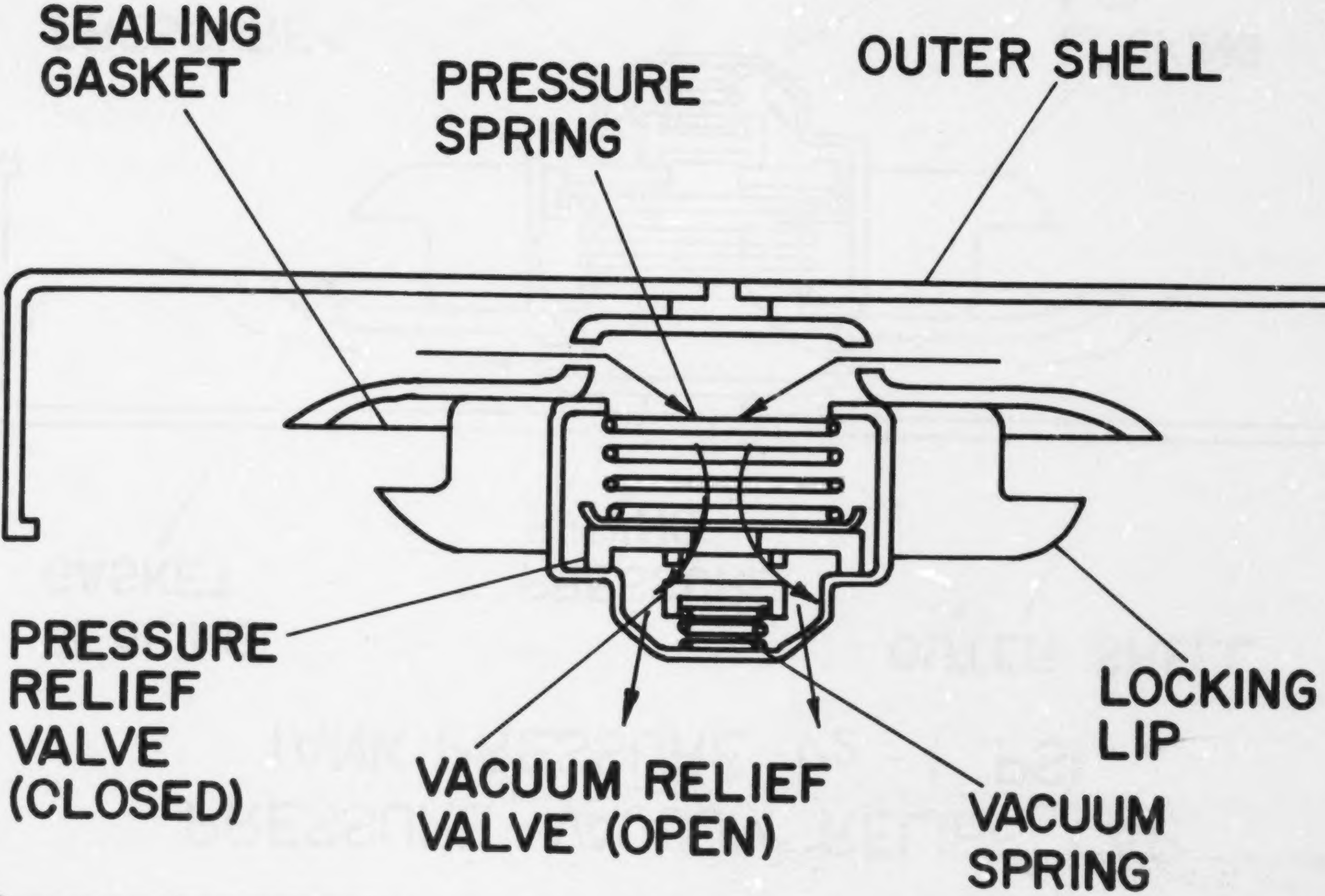
FEC. Fig. 2

PRESSURE - VACUUM RELIEF CAP
TANK PRESSURE 1/2 - 1 PSI

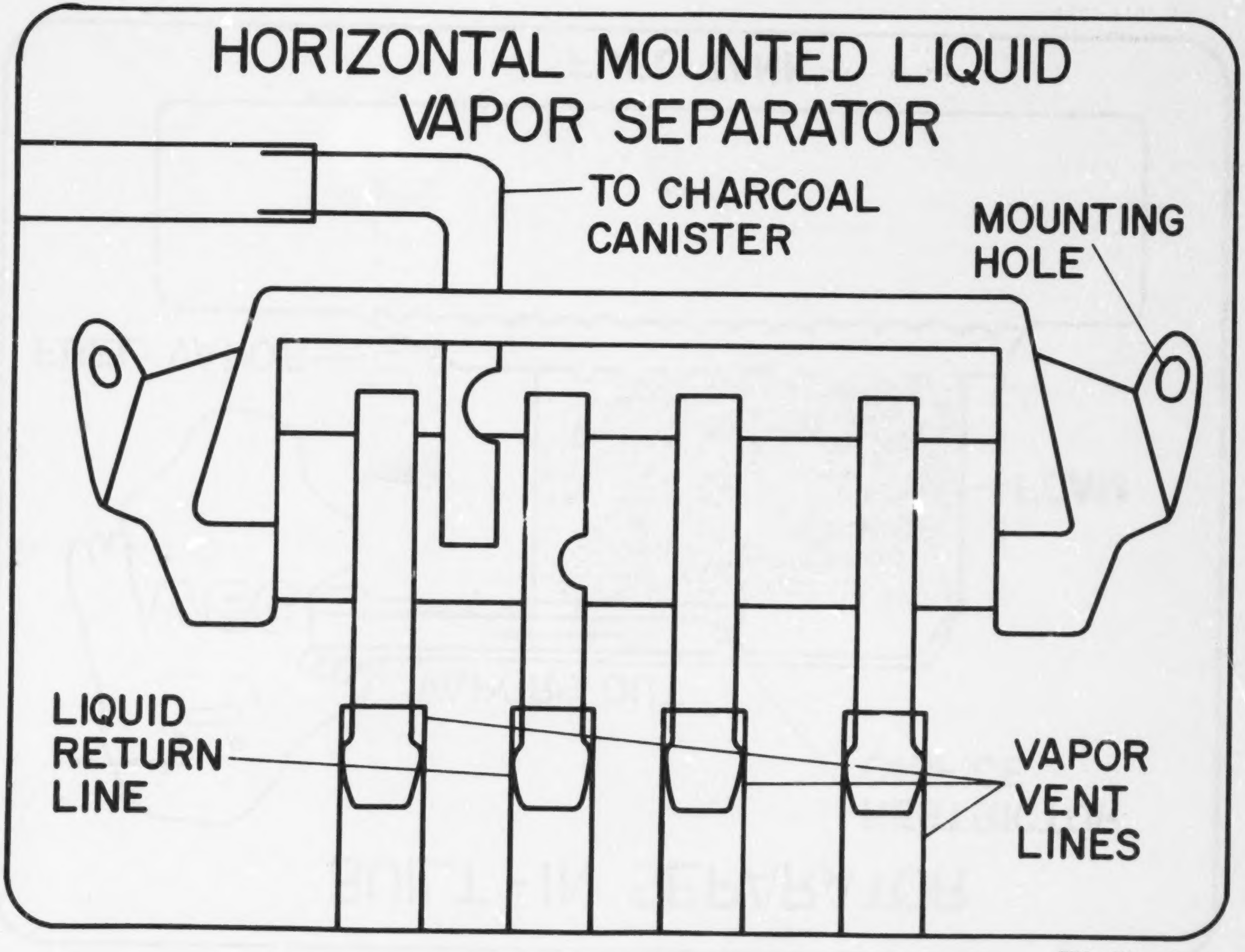

SEALING GASKET
PRESSURE SPRING
OUTER SHELL
PRESSURE RELIEF VALVE (OPEN)
VACUUM RELIEF VALVE (CLOSED)
VACUUM SPRING
LOCKING LIP

FEC. Fig. 3

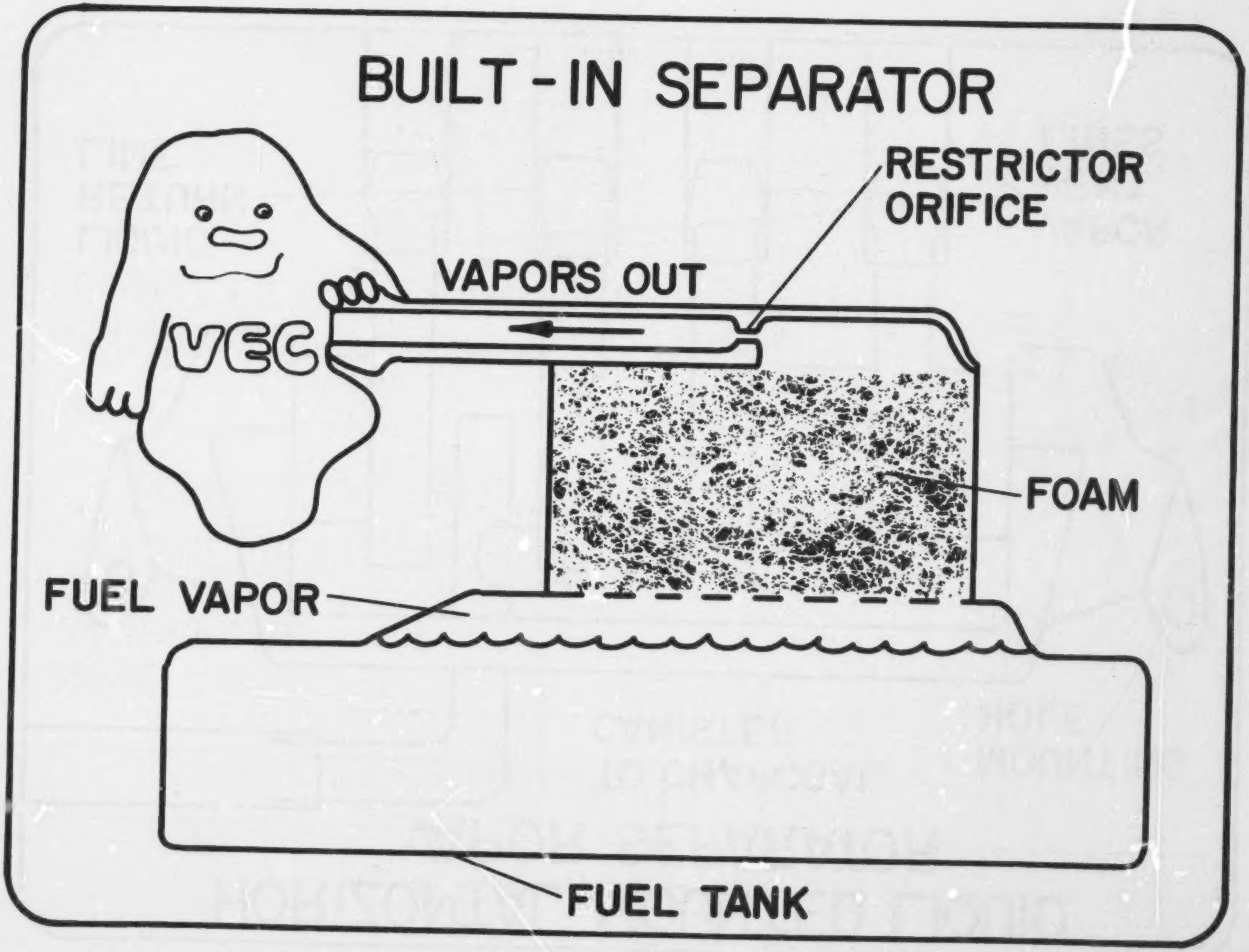
CAP RELIEVING TANK VACUUM
VACUUM 1/4" - 1/2" HG


SEALING GASKET
PRESSURE SPRING
OUTER SHELL
PRESSURE RELIEF VALVE (CLOSED)
VACUUM RELIEF VALVE (OPEN)
VACUUM SPRING
LOCKING LIP

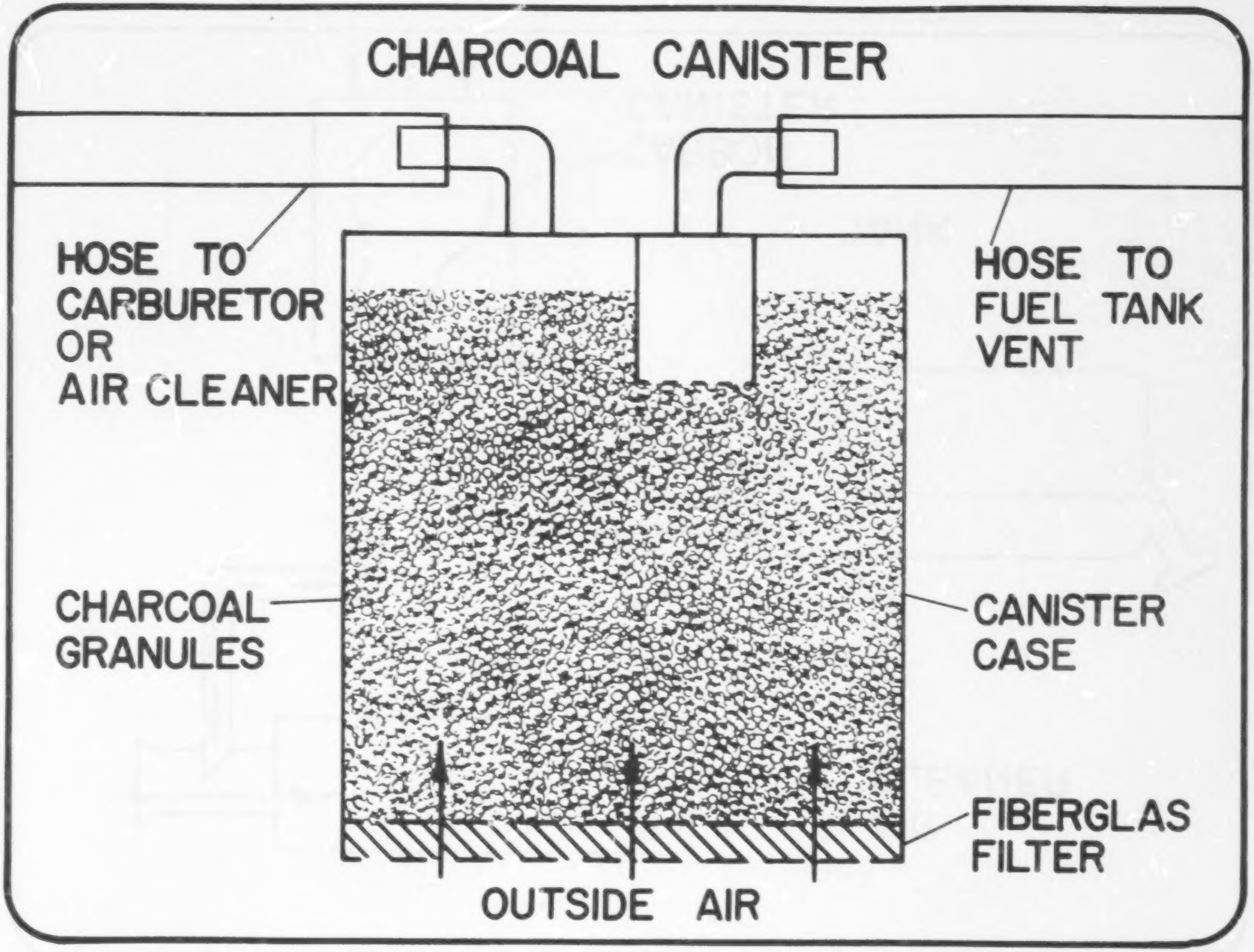
FFC Fig. 4


HORIZONTAL MOUNTED LIQUID
VAPOR SEPARATOR
TO CHARCOAL
CANISTER
MOUNTING
HOLE
LIQUID
RETURN
LINE
VAPOR
VENT
LINES

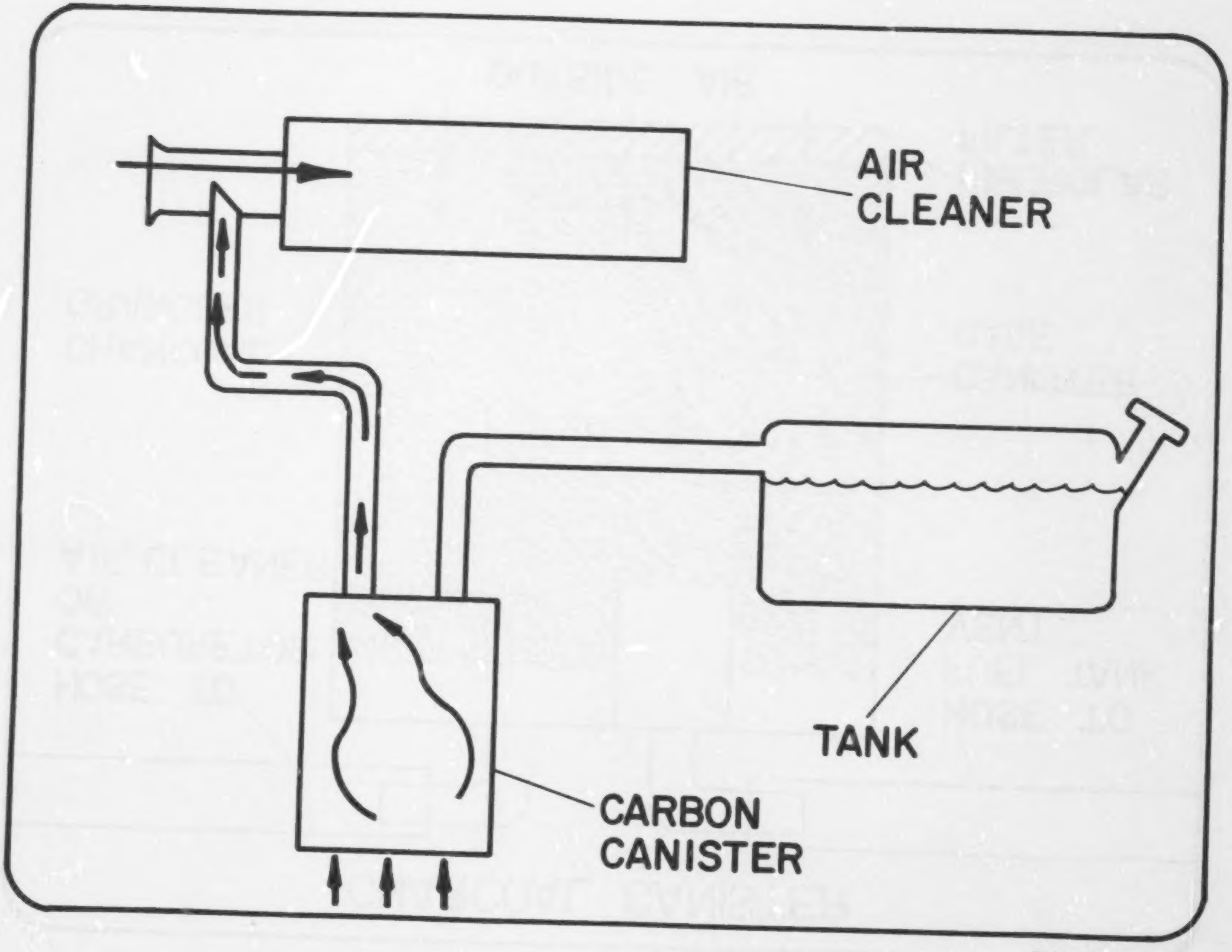
FEC. Fig. 5


BUILT - IN SEPARATOR
RESTRICTOR ORIFICE
VAPORS OUT
VEC
FOAM
FUEL VAPOR
FUEL TANK

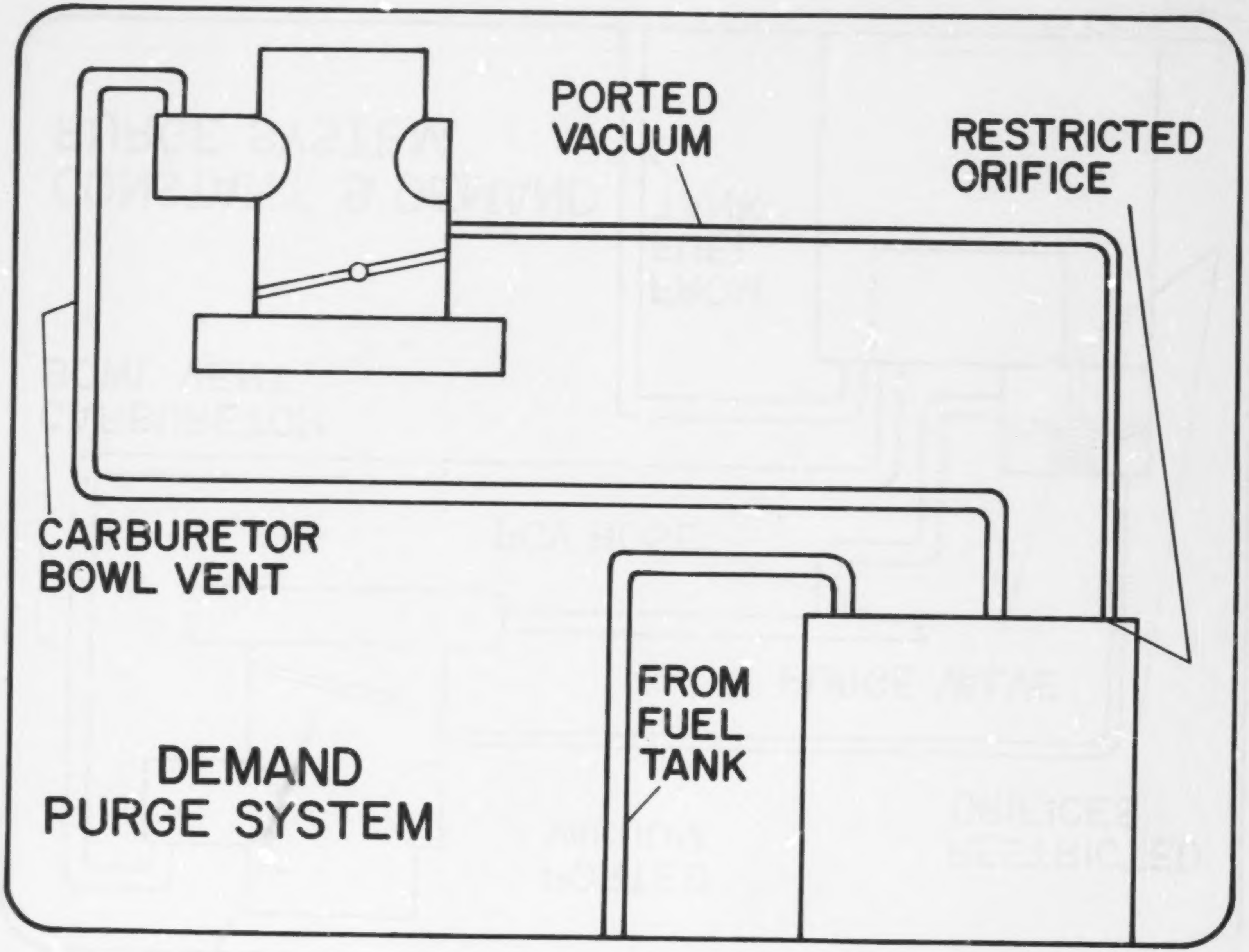
FEC. Fig. 6


CHARCOAL CANISTER
HOSE TO CARBURETOR OR AIR CLEANER
HOSE TO FUEL TANK VENT
CHARCOAL GRANULES
CANISTER CASE
FIBERGLAS FILTER
OUTSIDE AIR

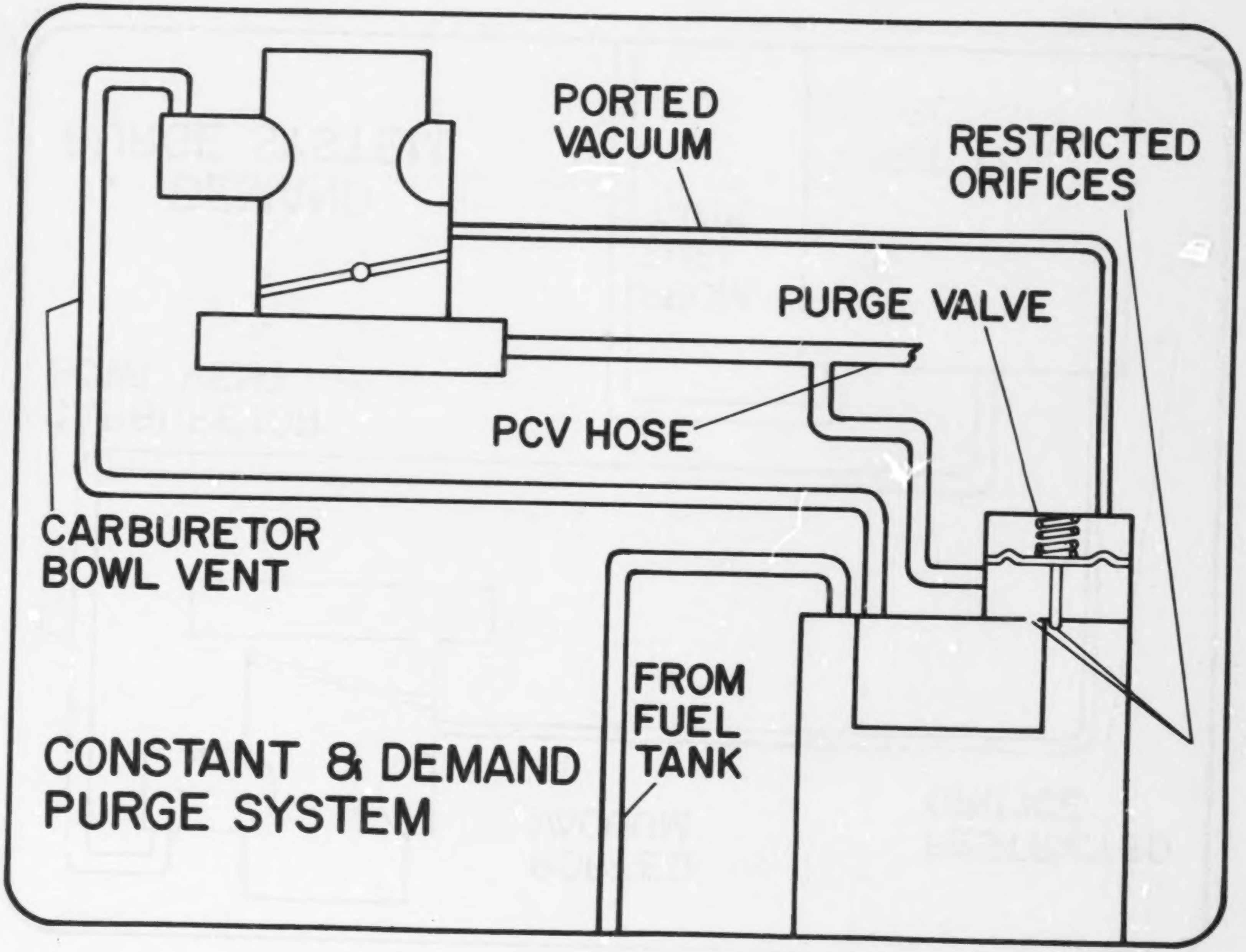
FEC. Fig. 7


AIR
CLEANER
TANK
CARBON
CANISTER

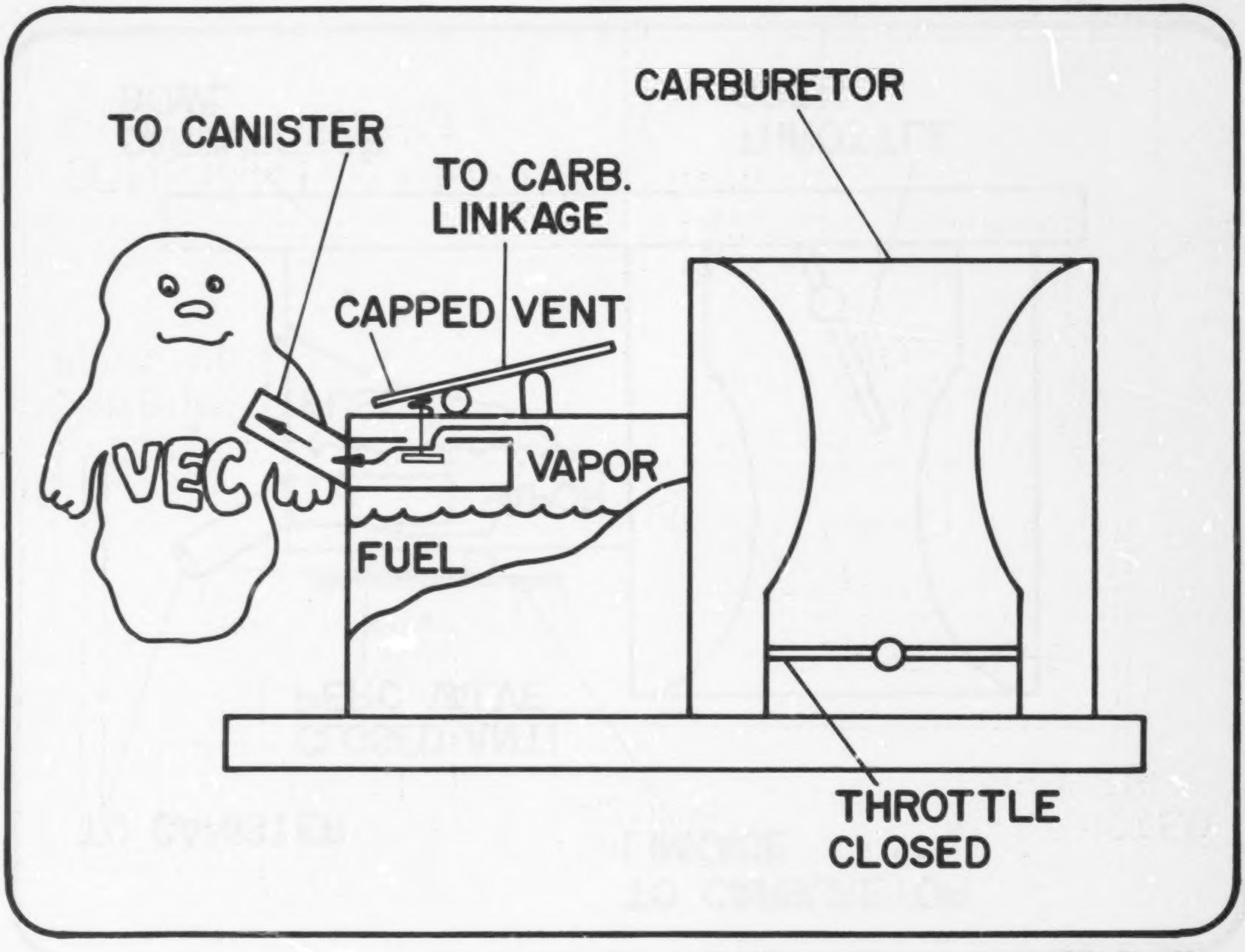
FEC. Fig. 8


PORTED
VACUUM
RESTRICTED
ORIFICE
CARBURETOR
BOWL VENT
FROM
FUEL
TANK
DEMAND
PURGE SYSTEM

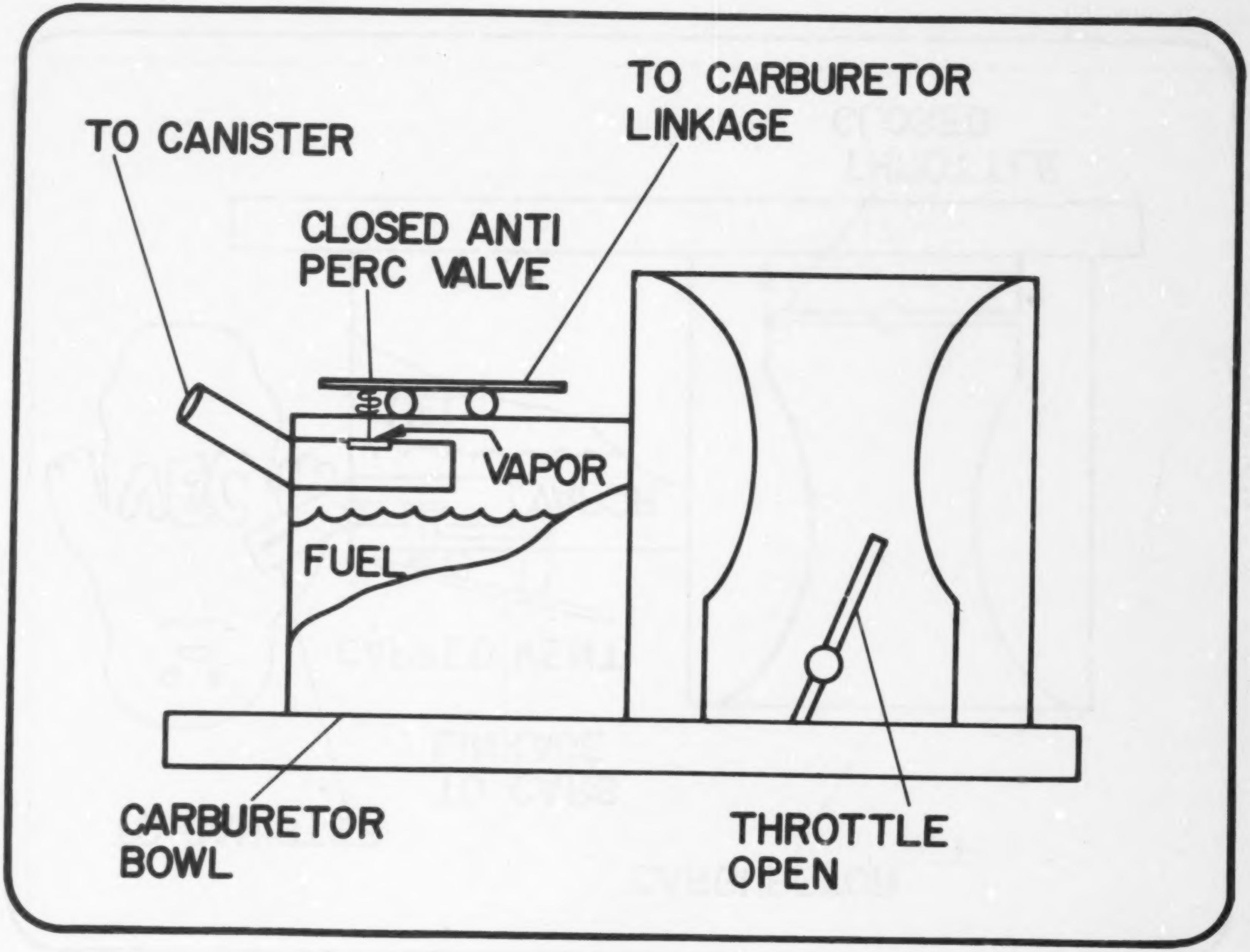
FEC. Fig. 9


PORTED
VACUUM
RESTRICTED
ORIFICES
PURGE VALVE
PCV HOSE
CARBURETOR
BOWL VENT
FROM
FUEL
TANK
CONSTANT & DEMAND
PURGE SYSTEM

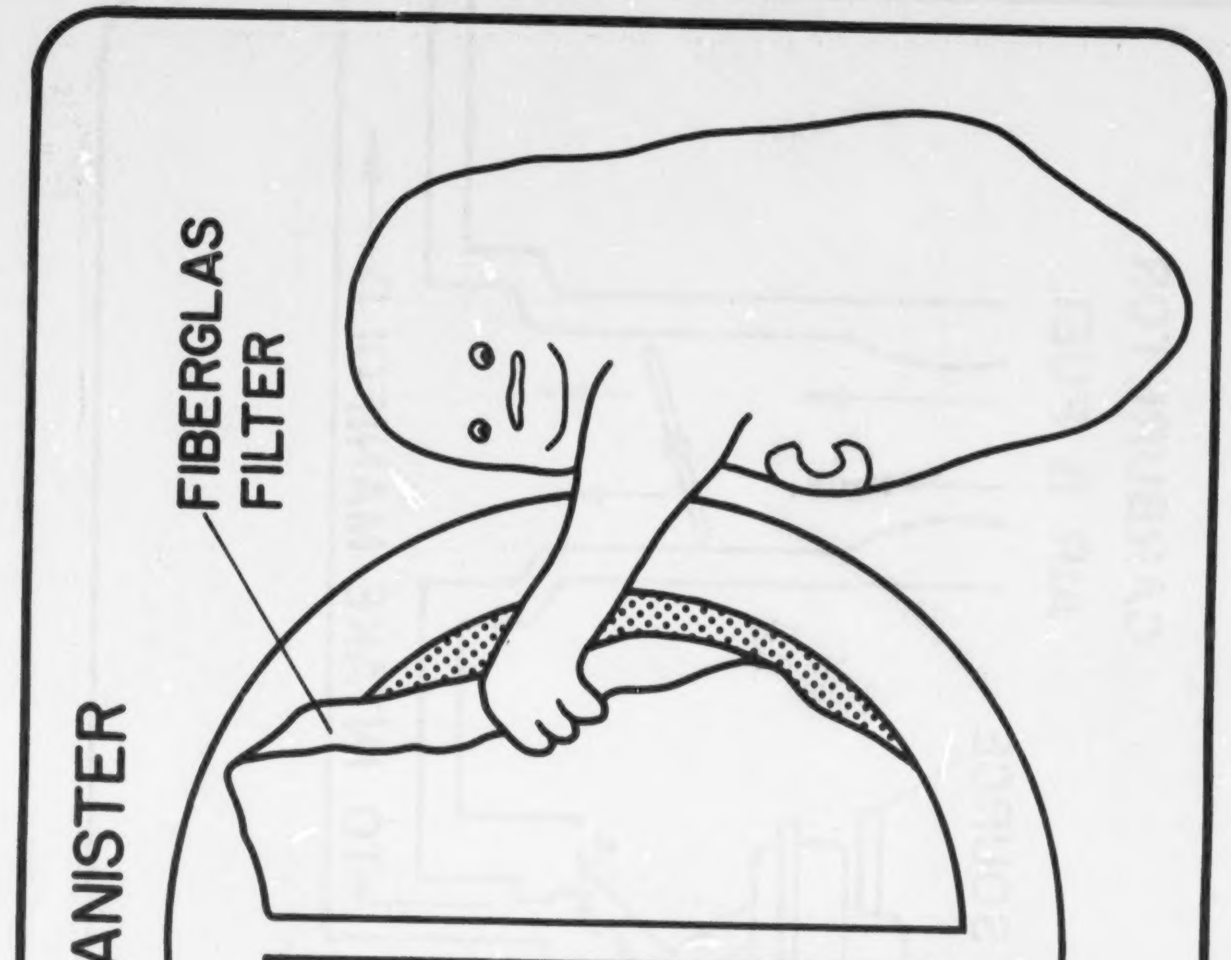
FEC. Fig. 10


TO CANISTER
TO CARB. LINKAGE
CAPPED VENT
CARBURETOR
VEC
VAPOR
FUEL
THROTTLE CLOSED

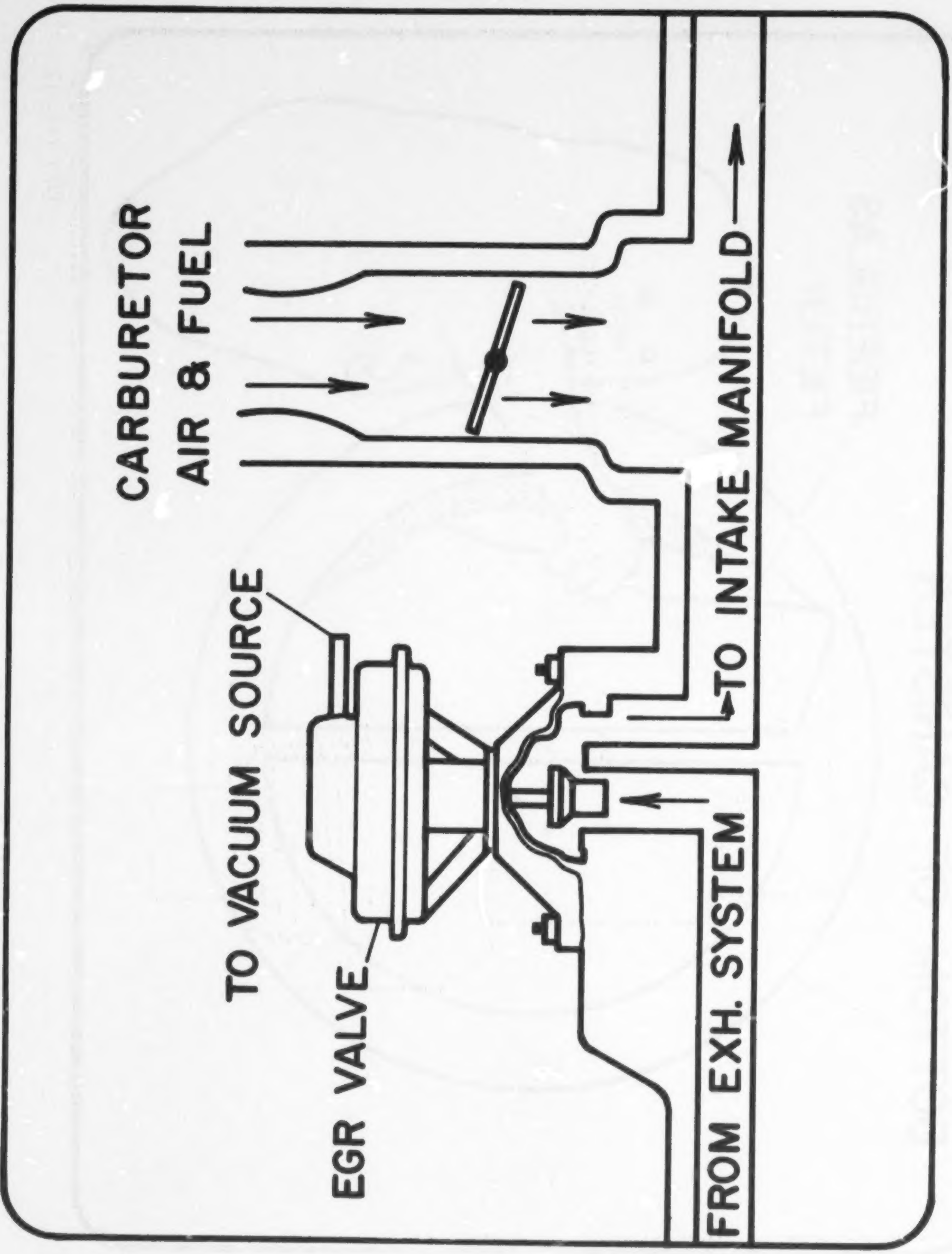
FEC. Fig. 11


TO CARBURETOR LINKAGE
TO CANISTER
CLOSED ANTI PERC VALVE
VAPOR
FUEL
CARBURETOR BOWL
THROTTLE OPEN

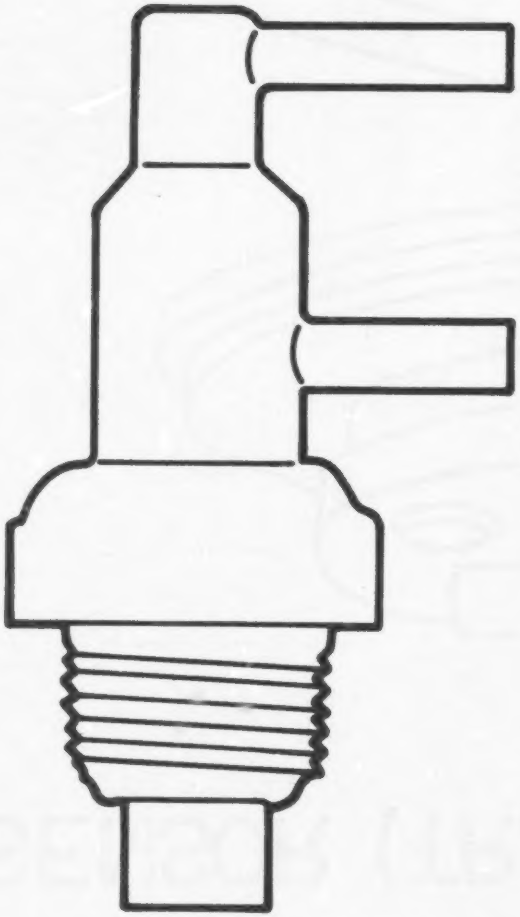
FEC. Fig. 12


BOTTOM OF CANISTER
FIBERGLAS FILTER

FEC. Fig. 13


CARBURETOR
AIR & FUEL
TO VACUUM SOURCE
EGR VALVE
TO INTAKE MANIFOLD
FROM EXH. SYSTEM

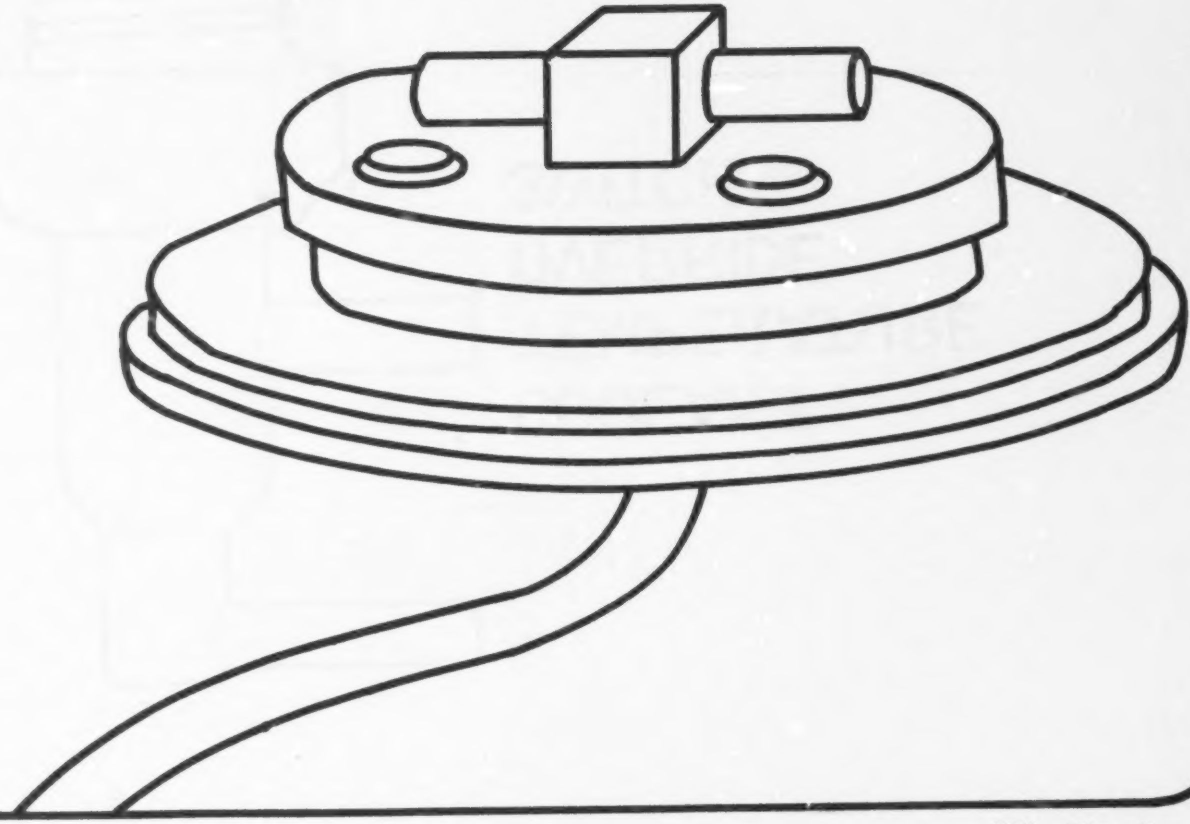
EGR. Fig. 1



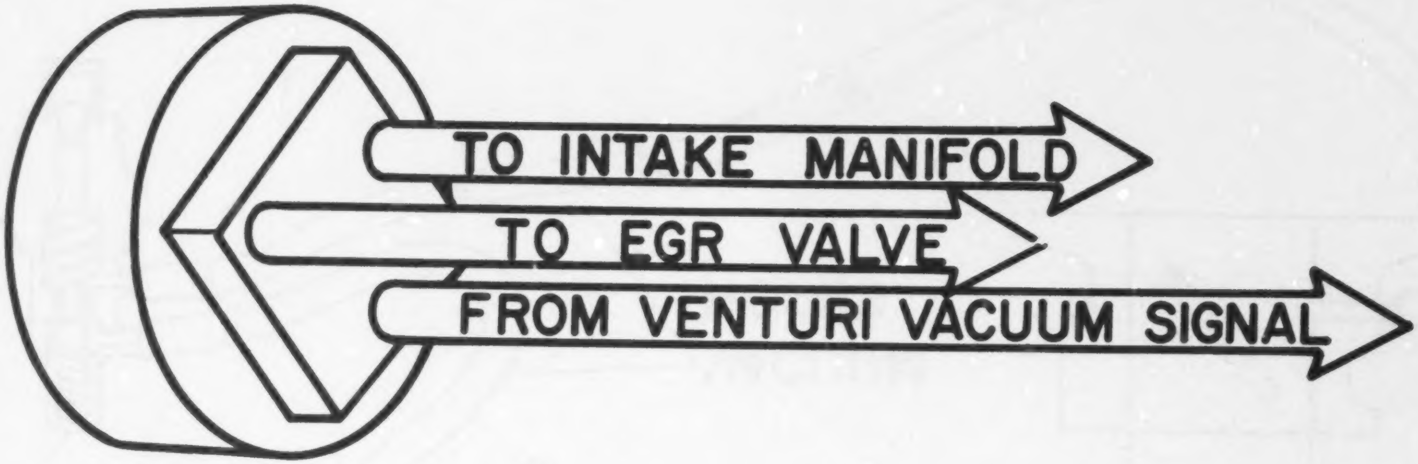
COOLANT
TEMPERATURE
OVERRIDE
SWITCH

EGR. Fig. 2

EXHAUST BACK - PRESSURE SENSOR (TRANSDUCER)



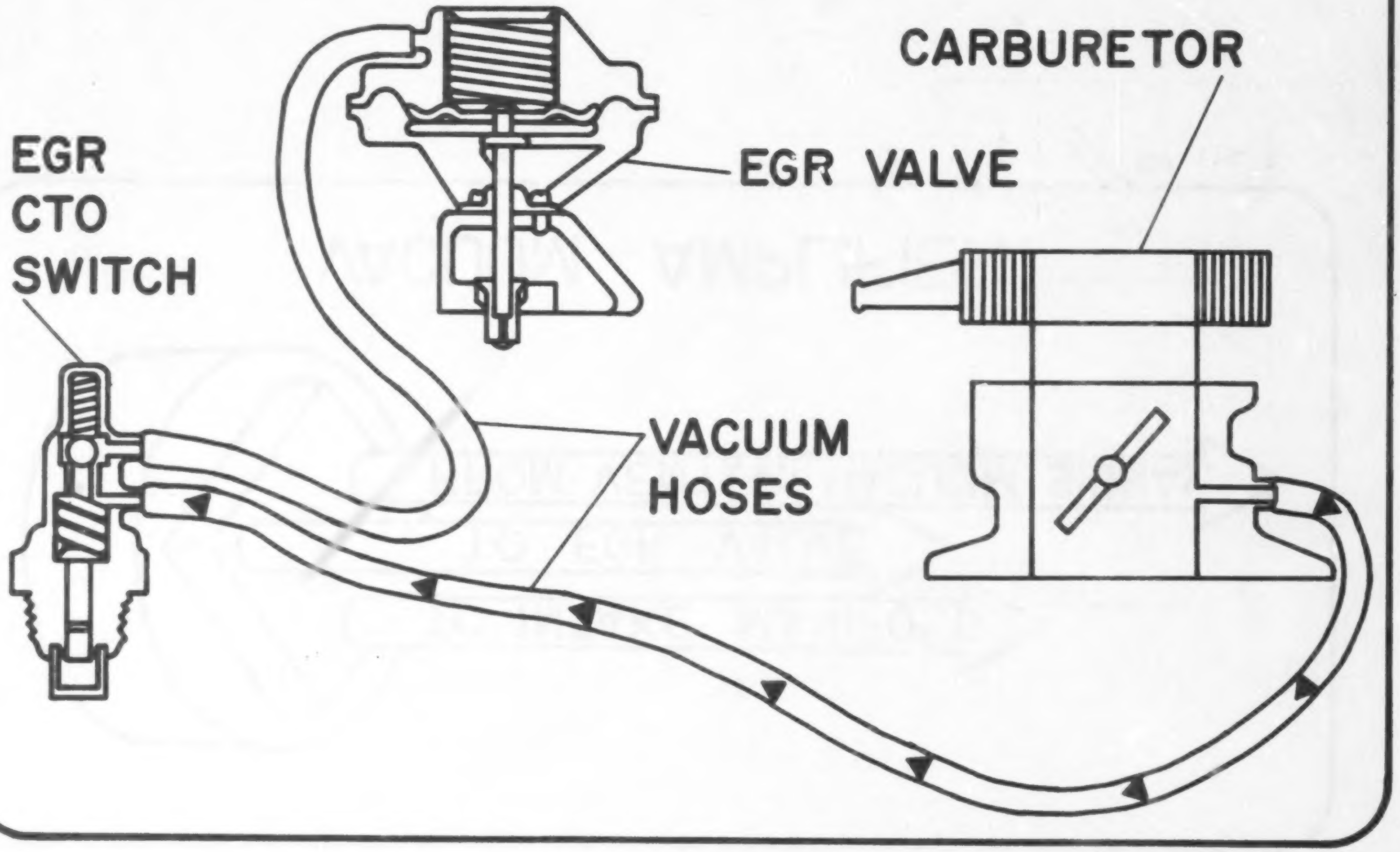
EGR. Fig. 3


TO INTAKE MANIFOLD
TO EGR VALVE
FROM VENTURI VACUUM SIGNAL

VACUUM AMPLIFIER

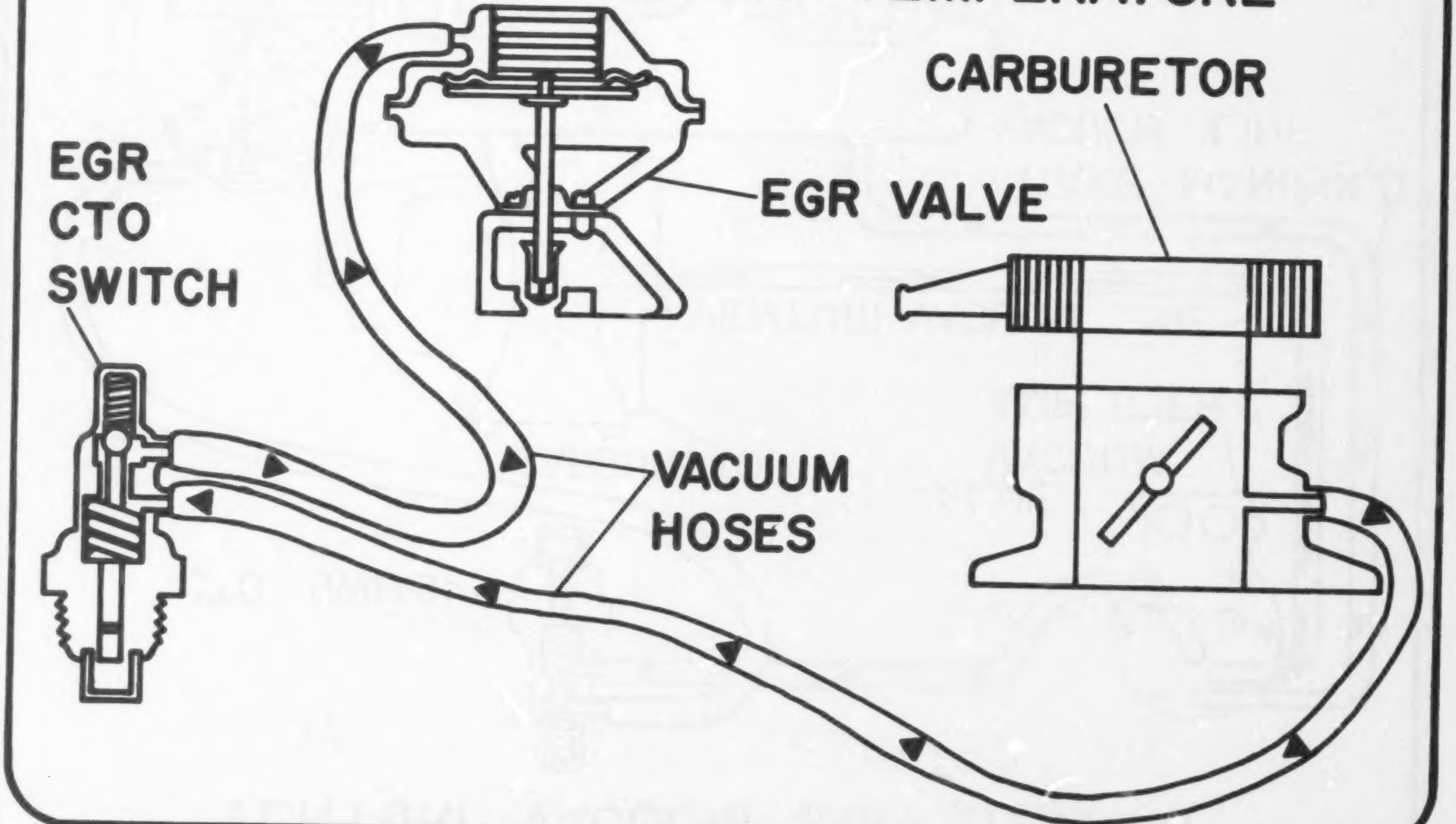
EGR. Fig. 4

PORTED VACUUM SYSTEM LOW COOLANT TEMPERATURE

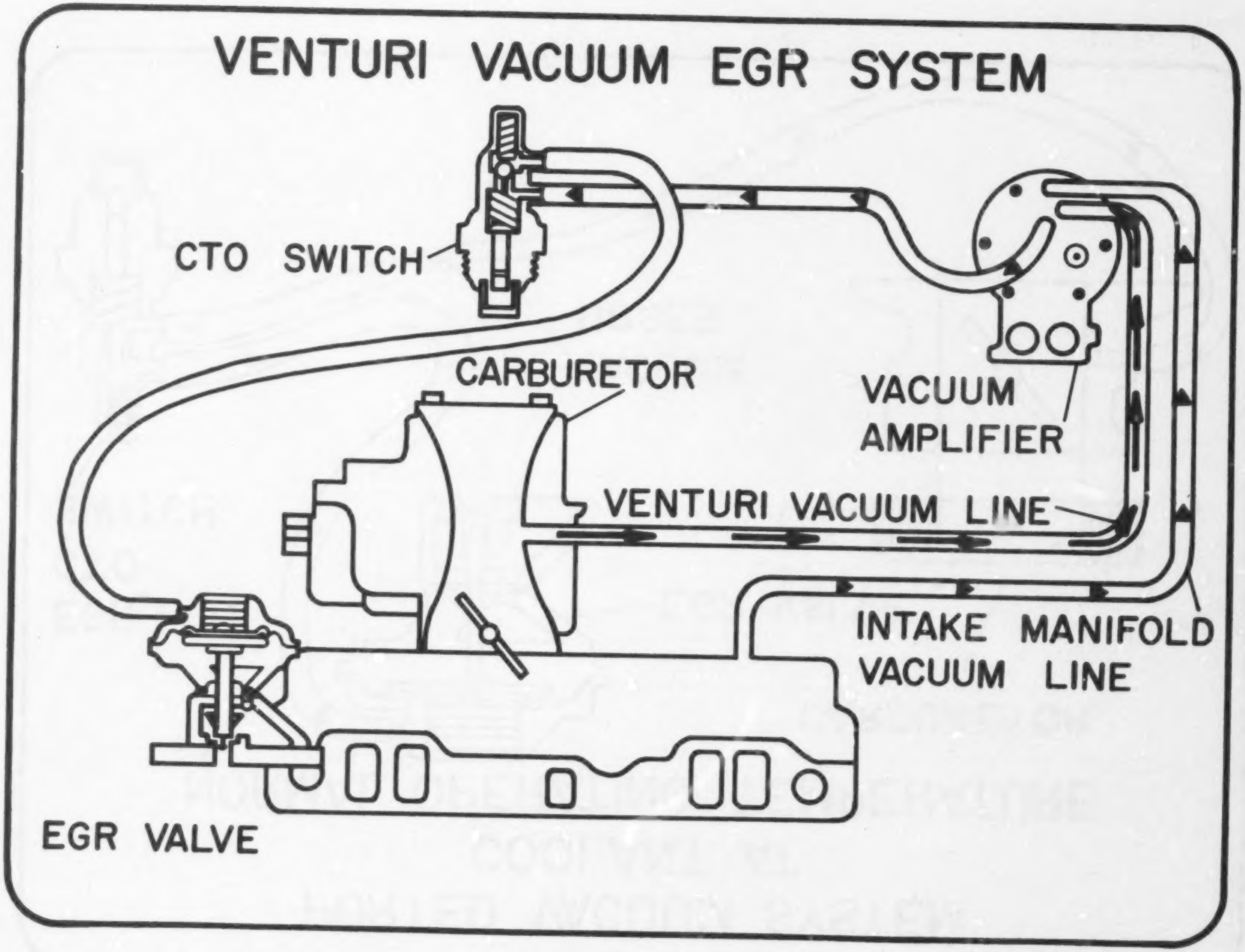

CARBURETOR
EGR VALVE
EGR
CTO
SWITCH
VACUUM
HOSES

EGR. Fig. 5

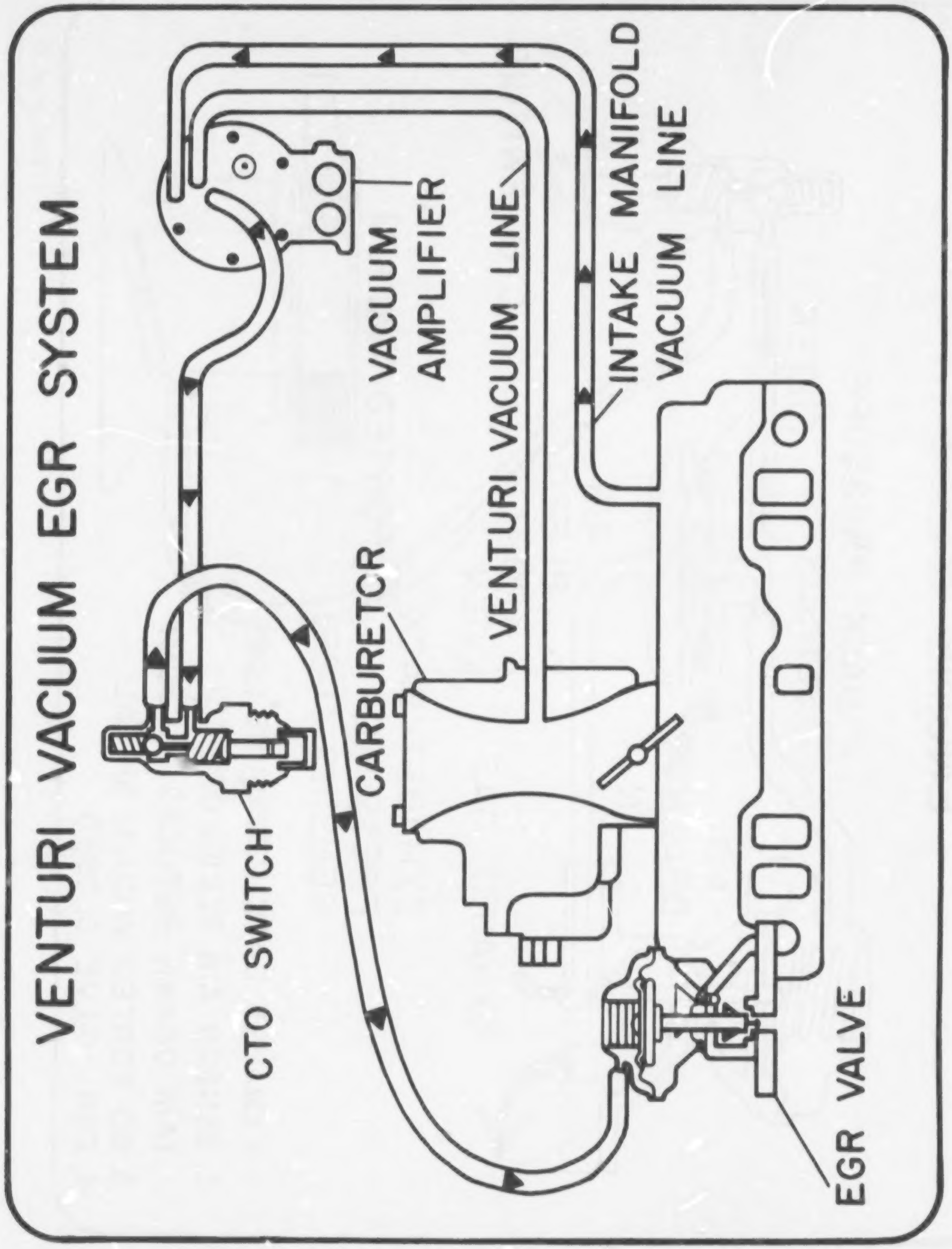
PORTED VACUUM SYSTEM
COOLANT AT
NORMAL OPERATING TEMPERATURE


CARBURETOR
EGR
CTO
SWITCH
EGR VALVE
VACUUM
HOSES

EGR. Fig. 6

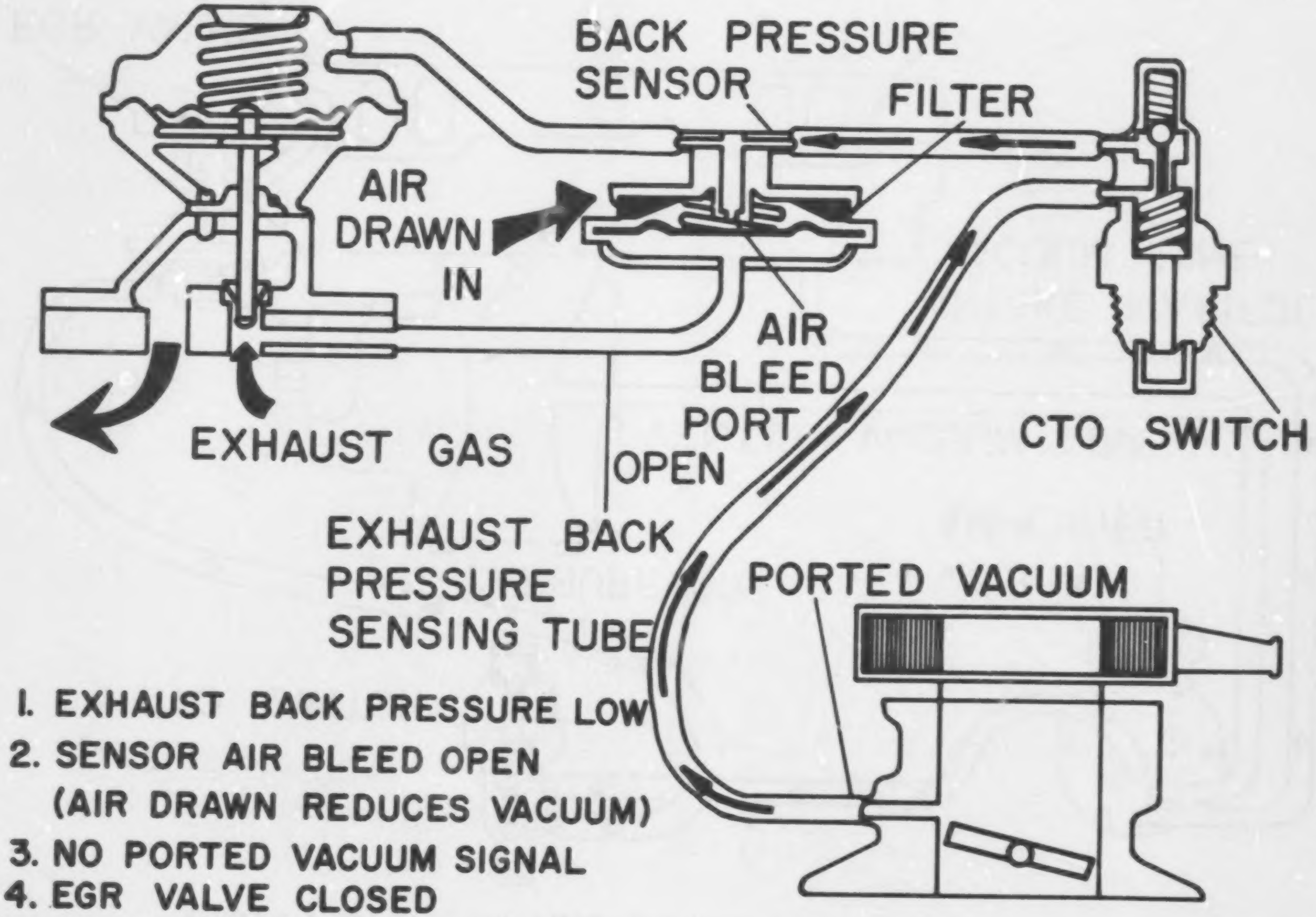

VENTURI VACUUM EGR SYSTEM
CTO SWITCH
CARBURETOR
VACUUM AMPLIFIER
VENTURI VACUUM LINE
INTAKE MANIFOLD VACUUM LINE
EGR VALVE

EGR. Fig. 7


VENTURI VACUUM EGR SYSTEM
CTO SWITCH
VACUUM AMPLIFIER
CARBURETOR
VENTURI VACUUM LINE
INTAKE MANIFOLD VACUUM LINE
EGR VALVE

EGR. Fig. 8

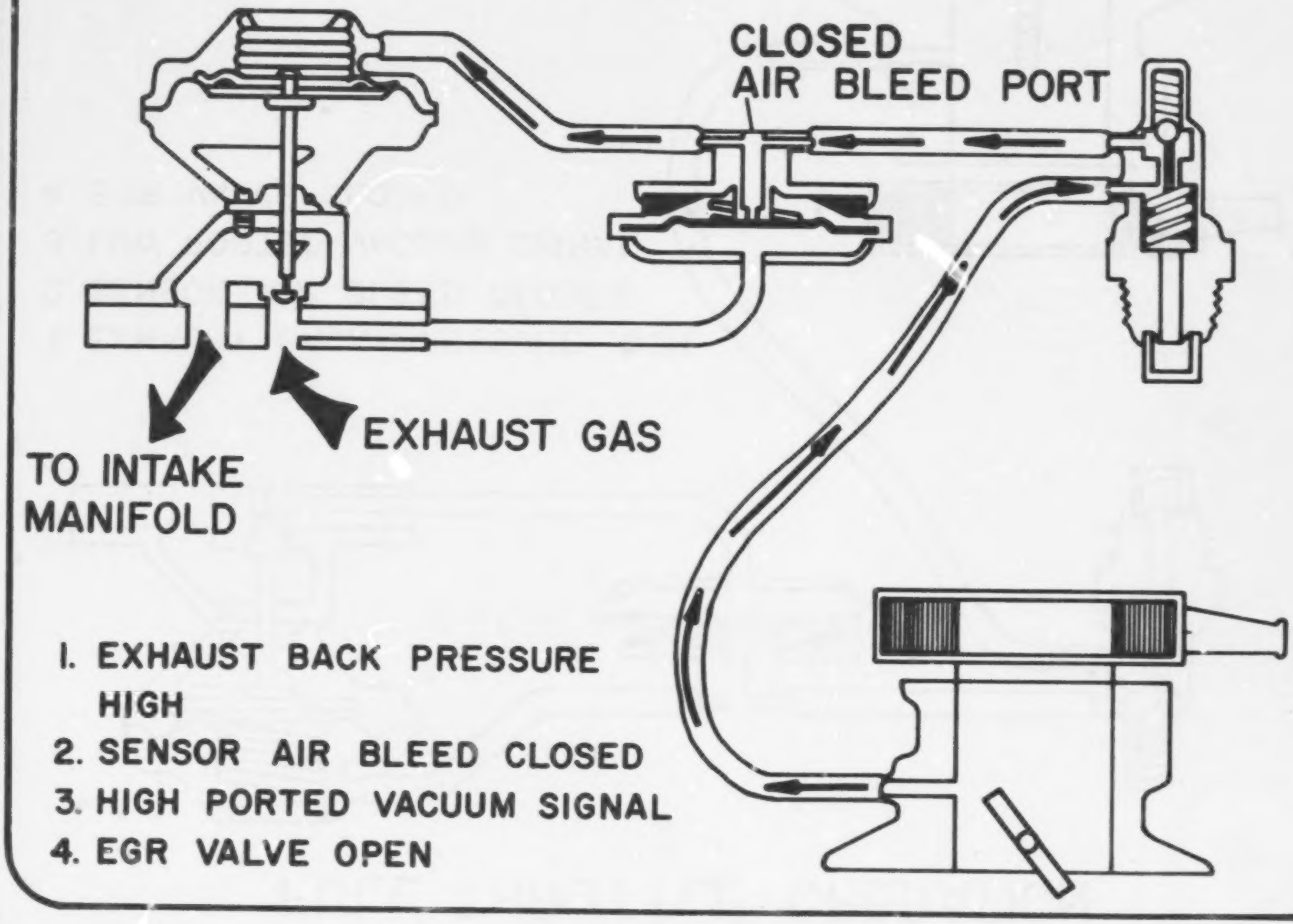
ENGINE IDLING


BACK PRESSURE SENSOR
FILTER
AIR DRAWN IN
AIR BLEED PORT OPEN
CTO SWITCH
EXHAUST GAS
EXHAUST BACK PRESSURE SENSING TUBE
PORTED VACUUM

1. EXHAUST BACK PRESSURE LOW
2. SENSOR AIR BLEED OPEN (AIR DRAWN REDUCES VACUUM)
3. NO PORTED VACUUM SIGNAL
4. EGR VALVE CLOSED

EGR. Fig. 9

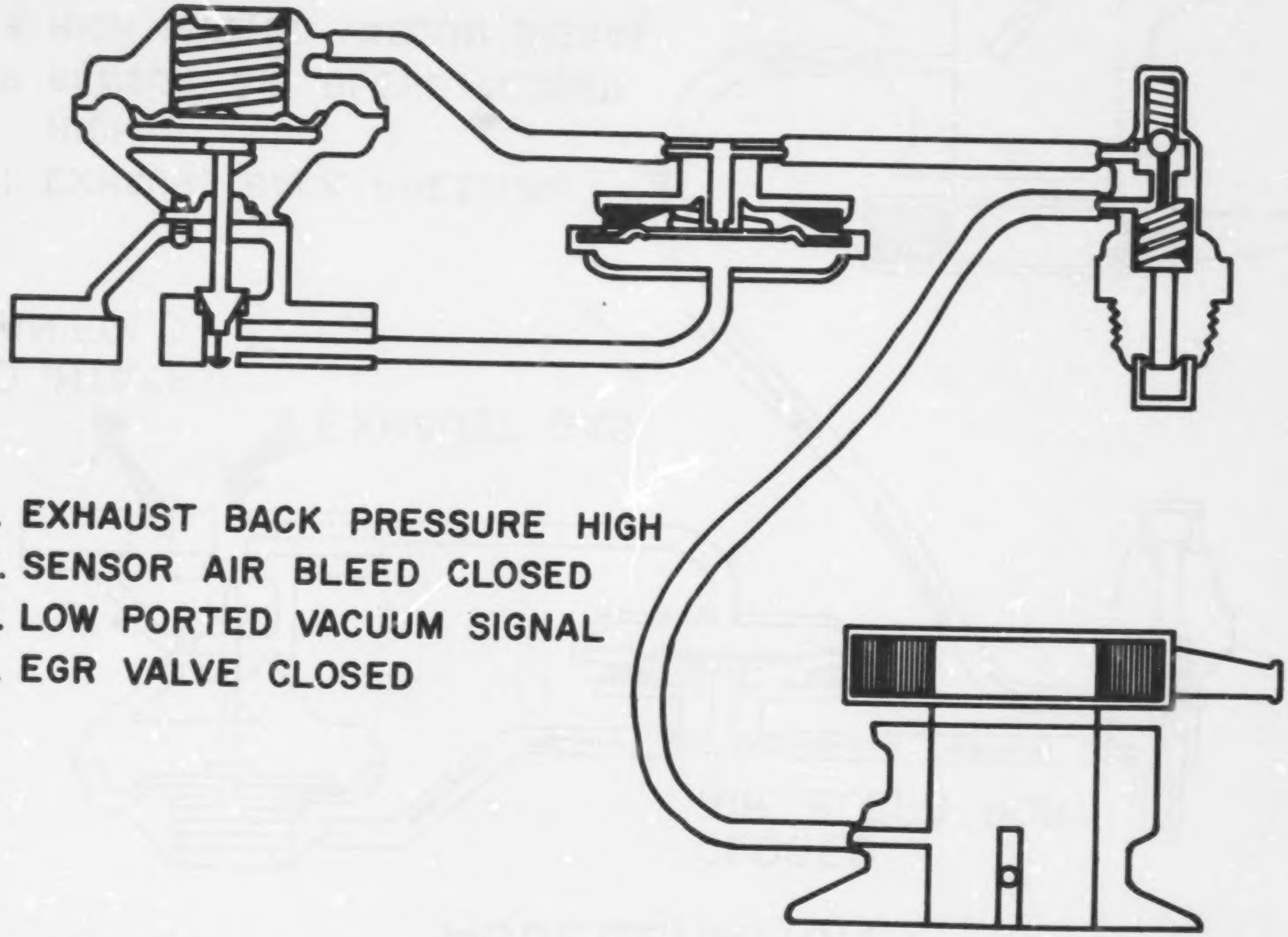
ACCELERATION


CLOSED
AIR BLEED PORT
EXHAUST GAS
TO INTAKE
MANIFOLD

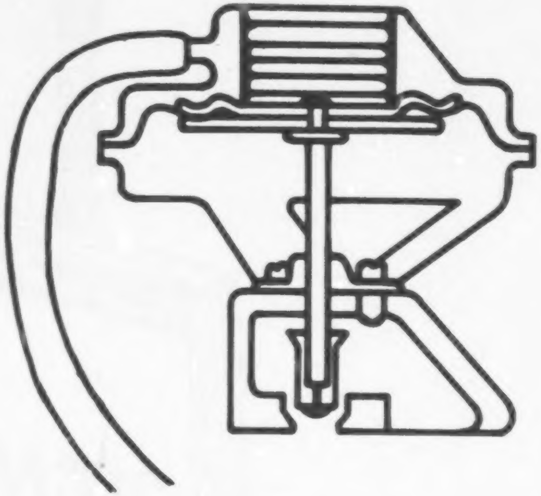
1. EXHAUST BACK PRESSURE HIGH
2. SENSOR AIR BLEED CLOSED
3. HIGH PORTED VACUUM SIGNAL
4. EGR VALVE OPEN

EGR. Fig. 10

FULL THROTTLE OPERATION

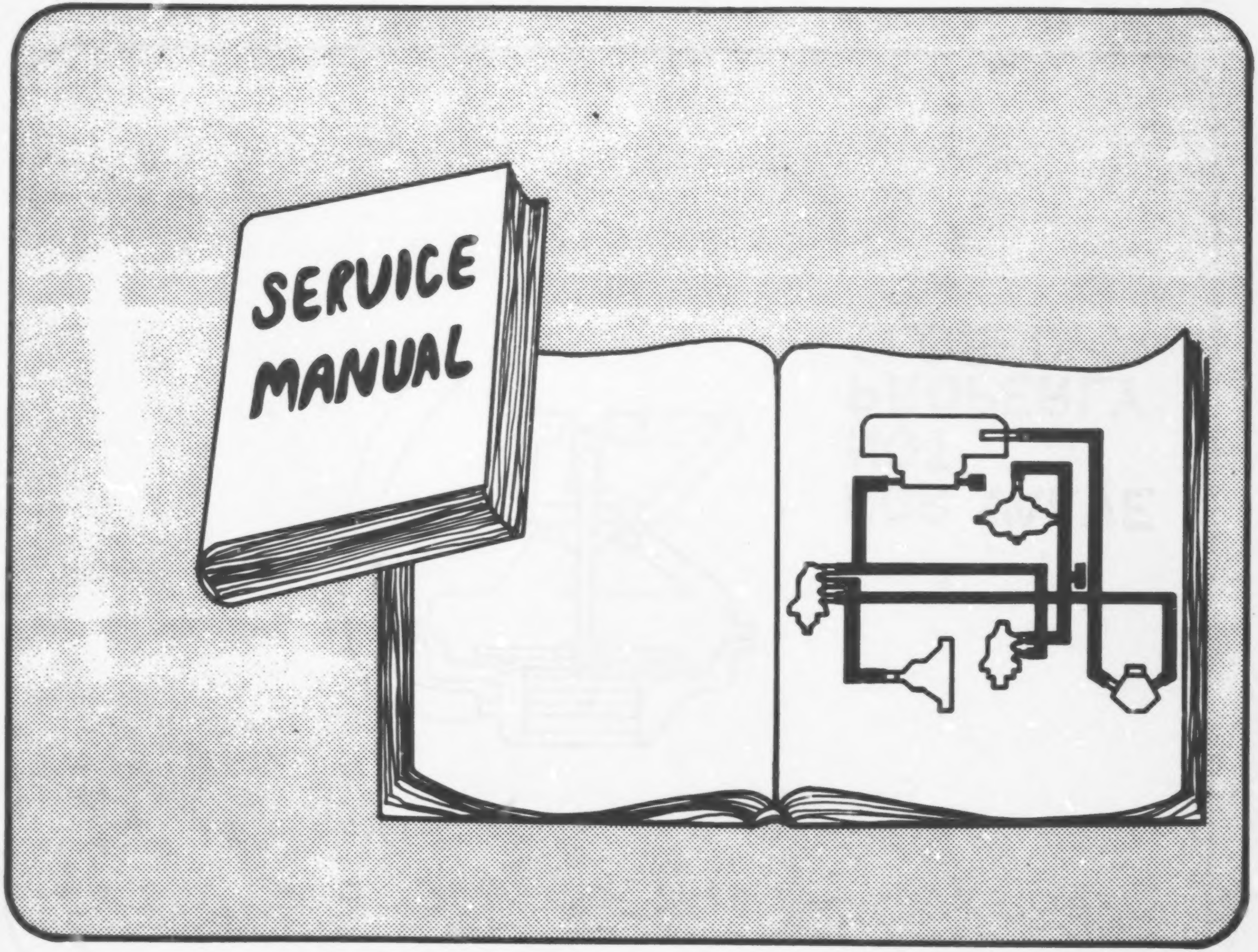


1. EXHAUST BACK PRESSURE HIGH
2. SENSOR AIR BLEED CLOSED
3. LOW PORTED VACUUM SIGNAL
4. EGR VALVE CLOSED



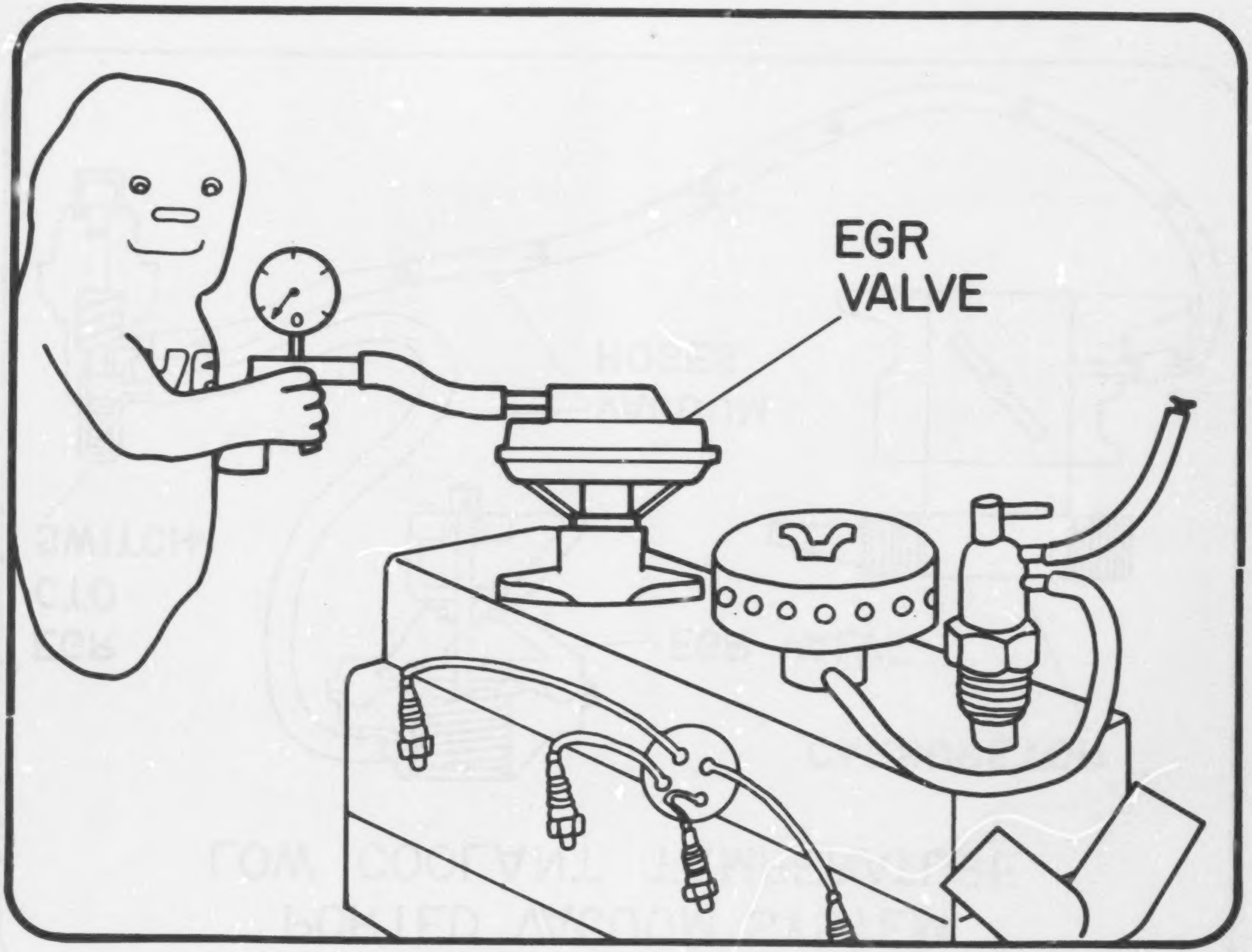
EGR VALVE
NOT
PROPERLY
CLOSED

EGR. Fig. 12



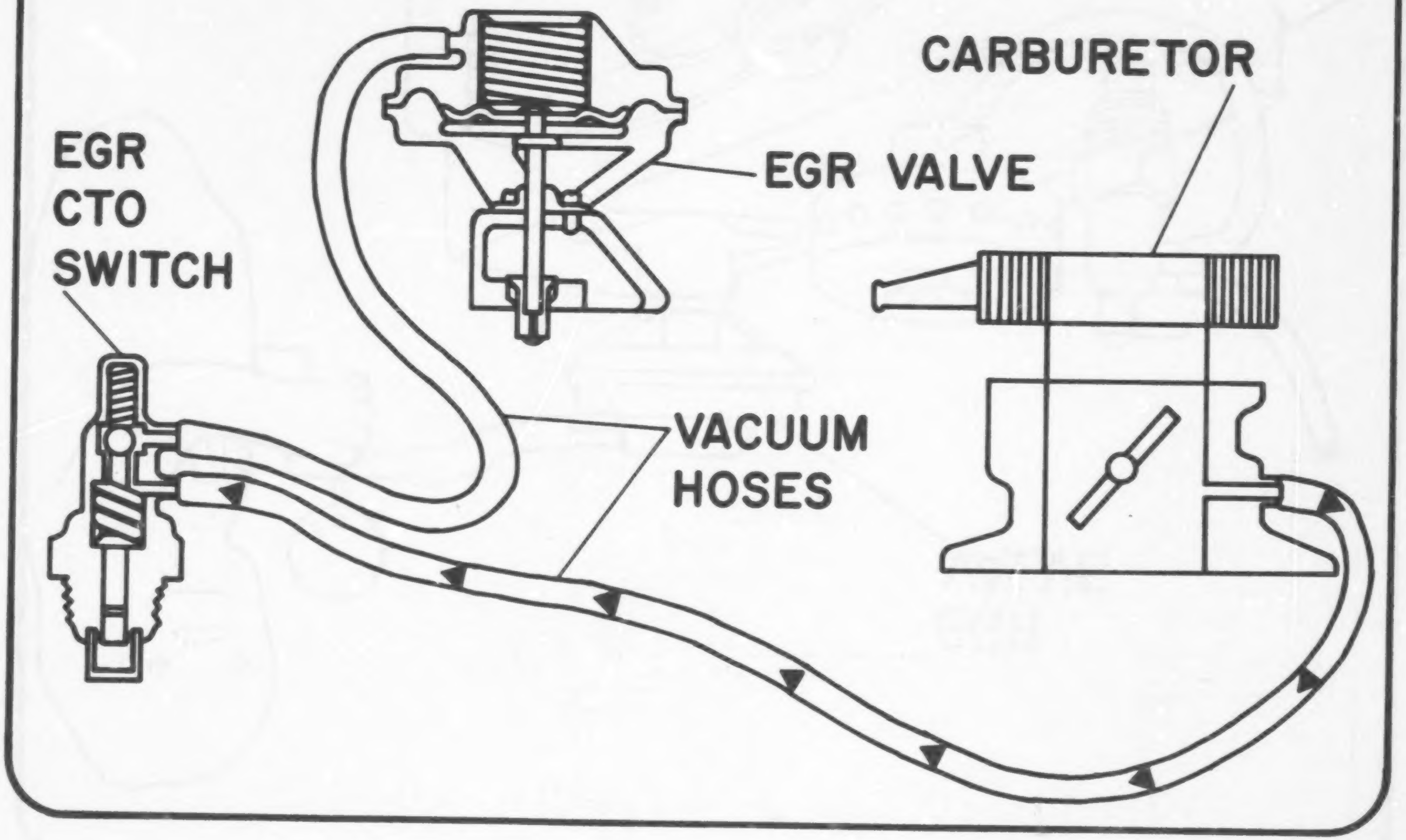
SERVICE
MANUAL

EGR. Fig. 13

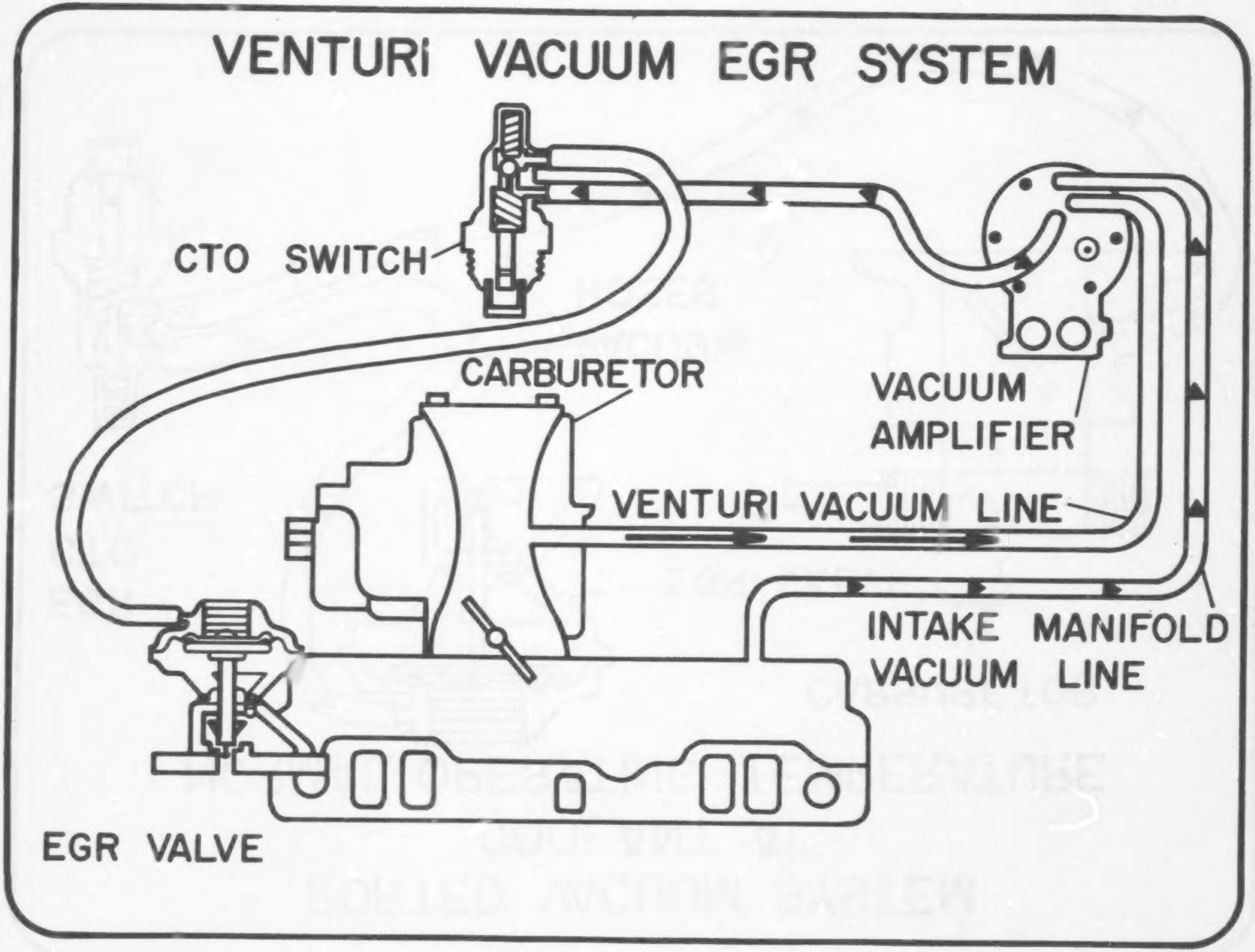


EGR. Fig. 14

PORTED VACUUM SYSTEM LOW COOLANT TEMPERATURE

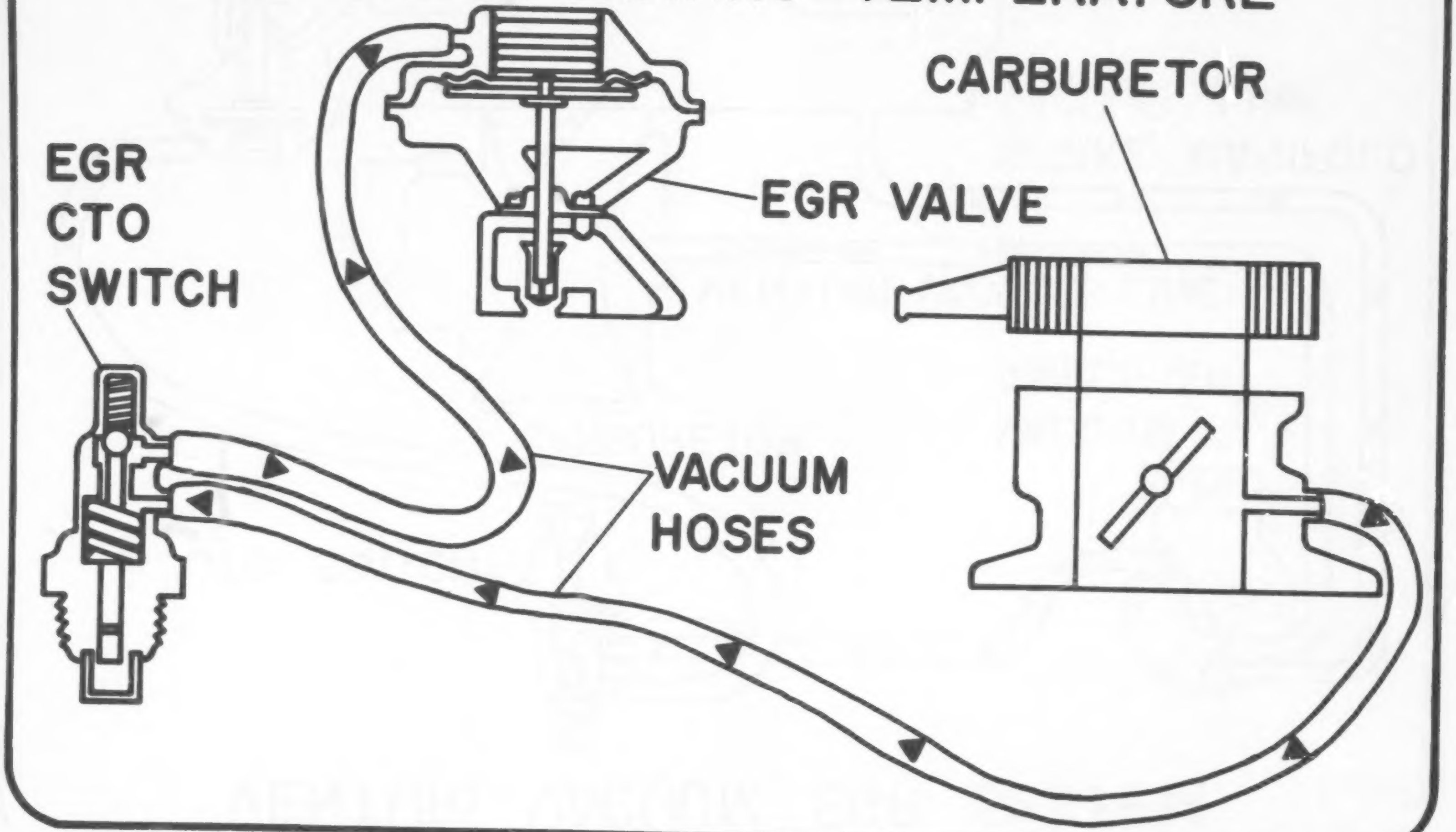

CARBURETOR
EGR VALVE
EGR
CTO
SWITCH
VACUUM
HOSES

EGR. Fig. 15

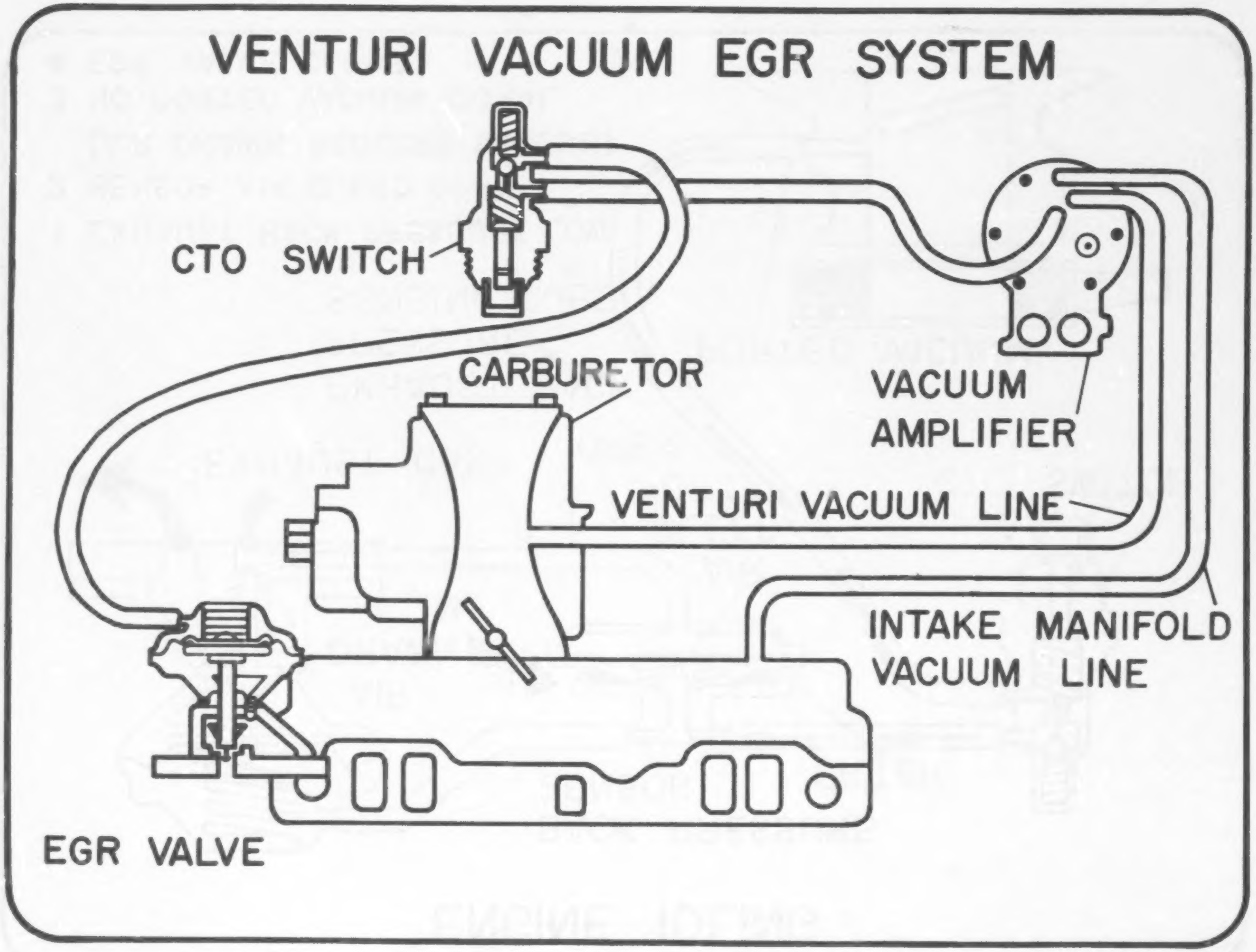

VENTURI VACUUM EGR SYSTEM
CTO SWITCH
CARBURETOR
VACUUM AMPLIFIER
VENTURI VACUUM LINE
INTAKE MANIFOLD VACUUM LINE
EGR VALVE

EGR. Fig. 16

PORTED VACUUM SYSTEM
COOLANT AT
NORMAL OPERATING TEMPERATURE

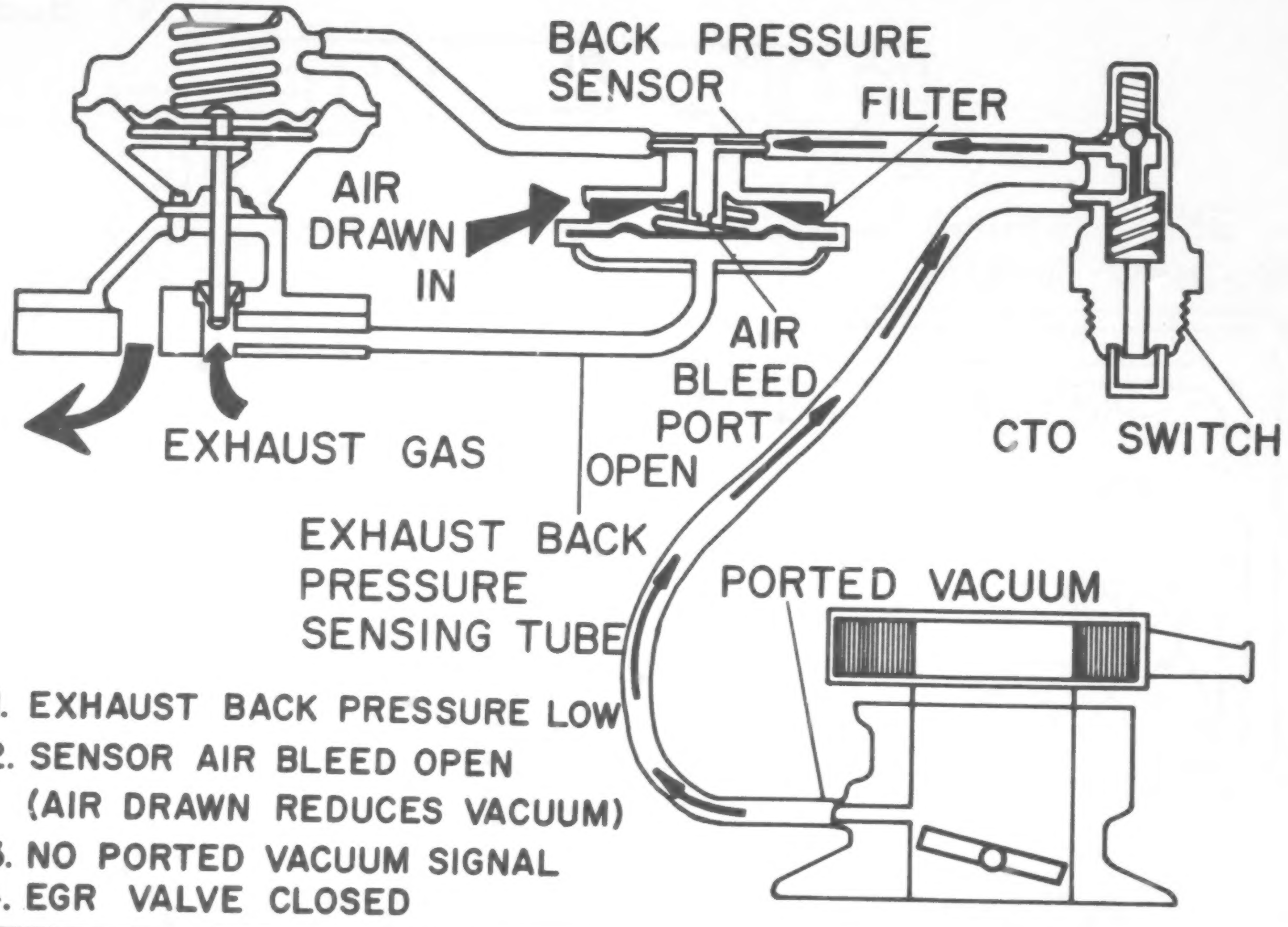

CARBURETOR
EGR
CTO
SWITCH
EGR VALVE
VACUUM
HOSES

EGR. Fig. 17


VENTURI VACUUM EGR SYSTEM
CTO SWITCH
CARBURETOR
VACUUM AMPLIFIER
VENTURI VACUUM LINE
INTAKE MANIFOLD VACUUM LINE
EGR VALVE

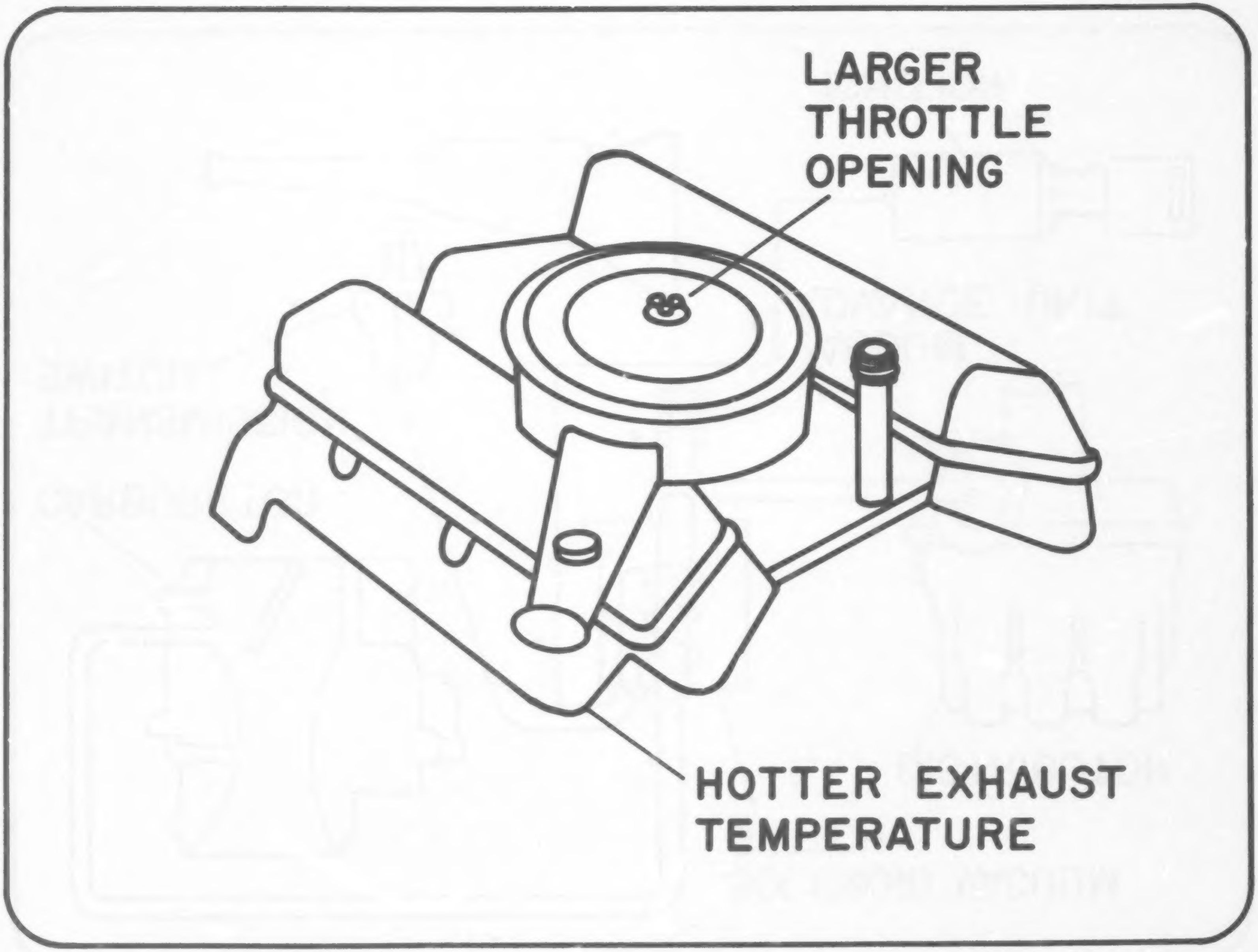
EGR. Fig. 18

ENGINE IDLING

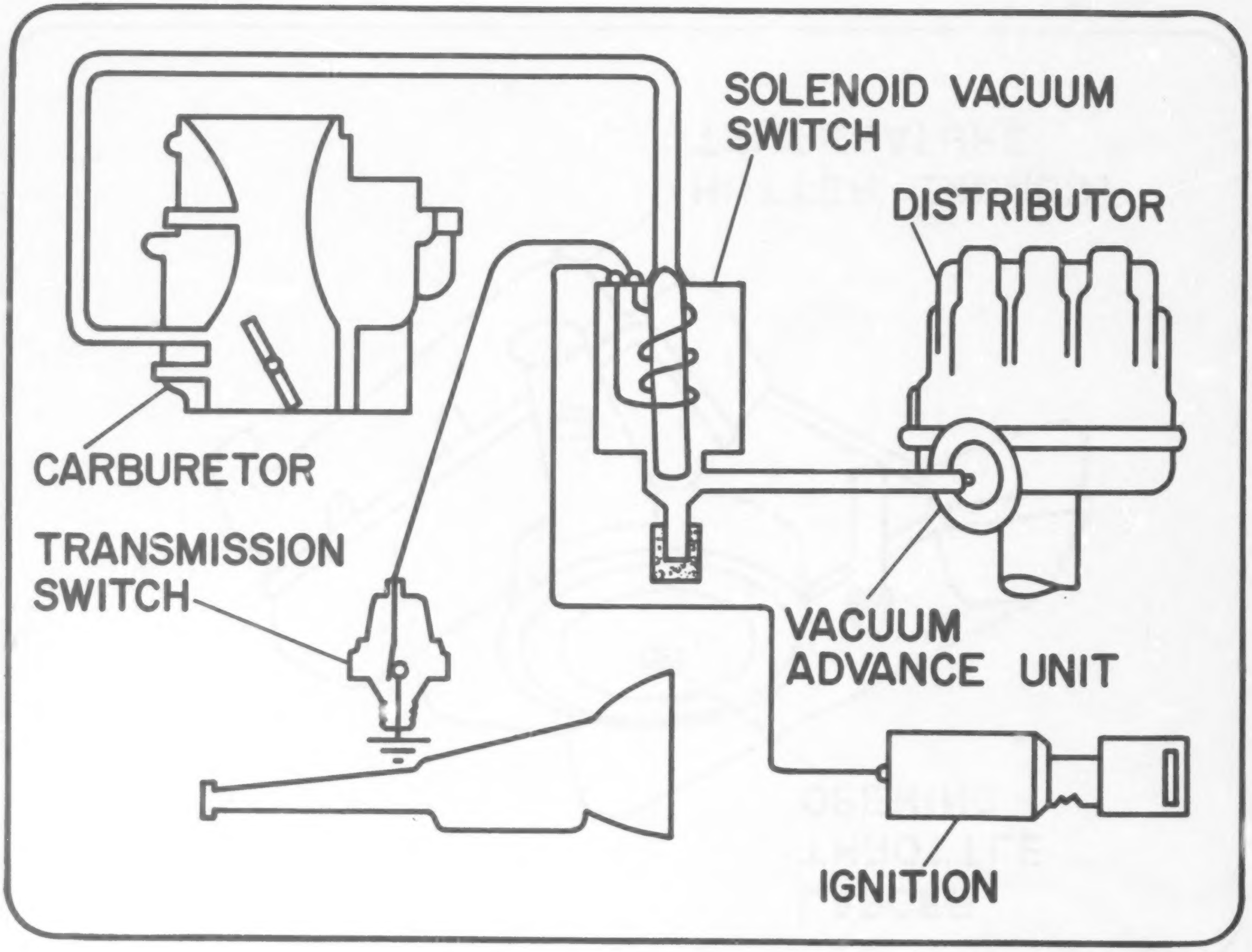

BACK PRESSURE SENSOR
FILTER
AIR DRAWN IN
AIR BLEED PORT OPEN
CTO SWITCH
EXHAUST GAS
EXHAUST BACK PRESSURE SENSING TUBE
PORTED VACUUM

1. EXHAUST BACK PRESSURE LOW
2. SENSOR AIR BLEED OPEN
   (AIR DRAWN REDUCES VACUUM)
3. NO PORTED VACUUM SIGNAL
4. EGR VALVE CLOSED

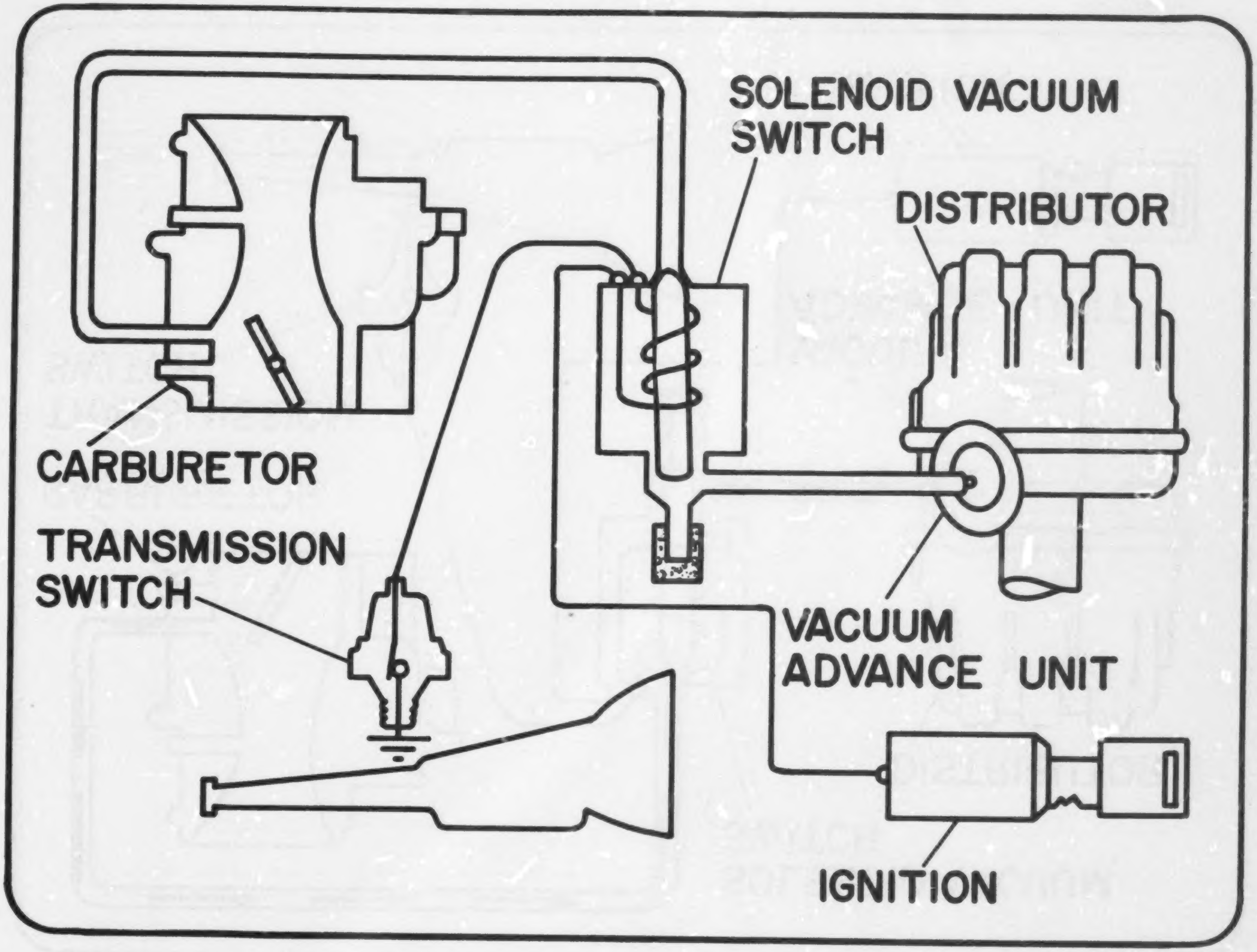
EGR. Fig. 19


LARGER THROTTLE OPENING
HOTTER EXHAUST TEMPERATURE

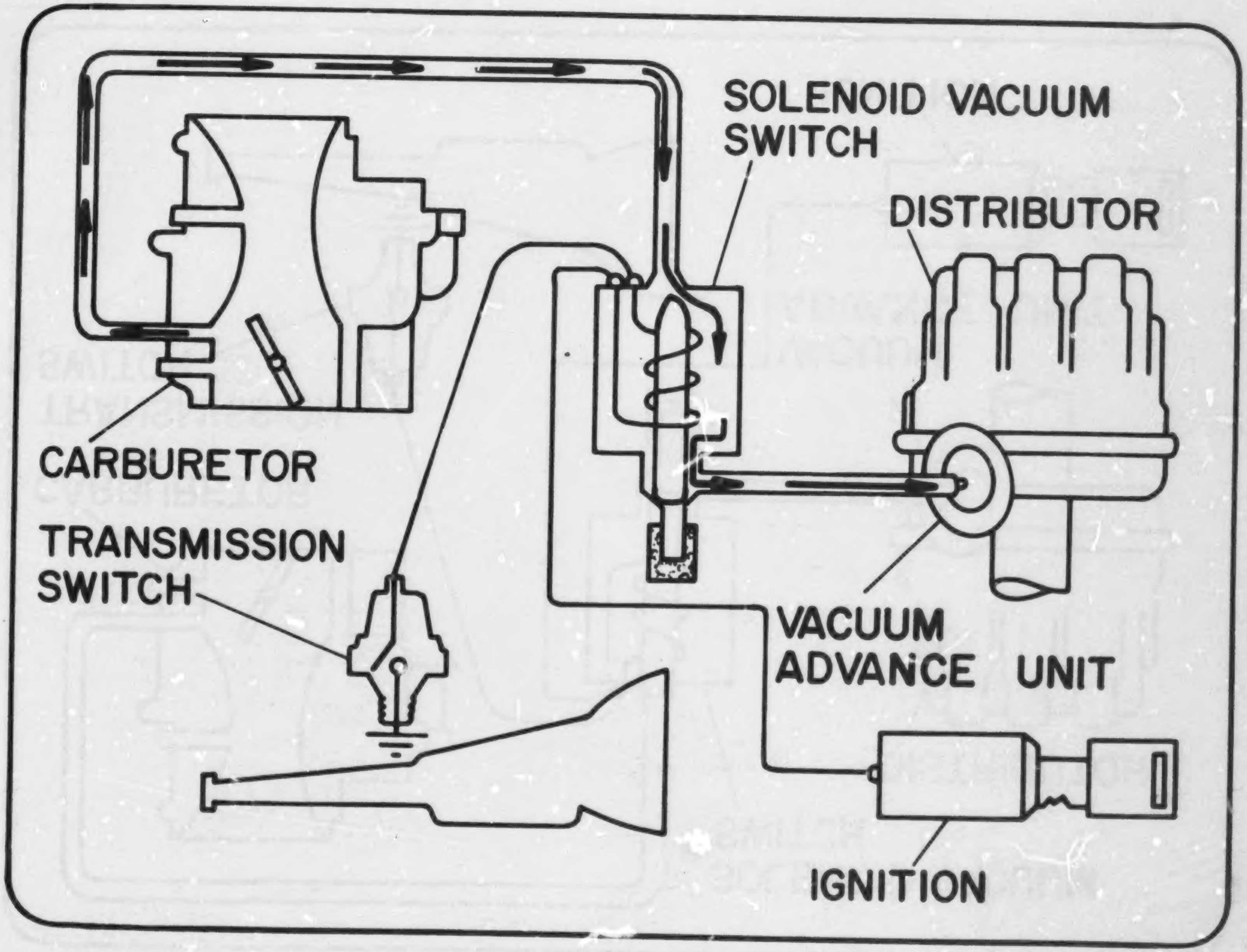
SC Fig. 1


SOLENOID VACUUM SWITCH
DISTRIBUTOR
CARBURETOR
TRANSMISSION SWITCH
VACUUM ADVANCE UNIT
IGNITION

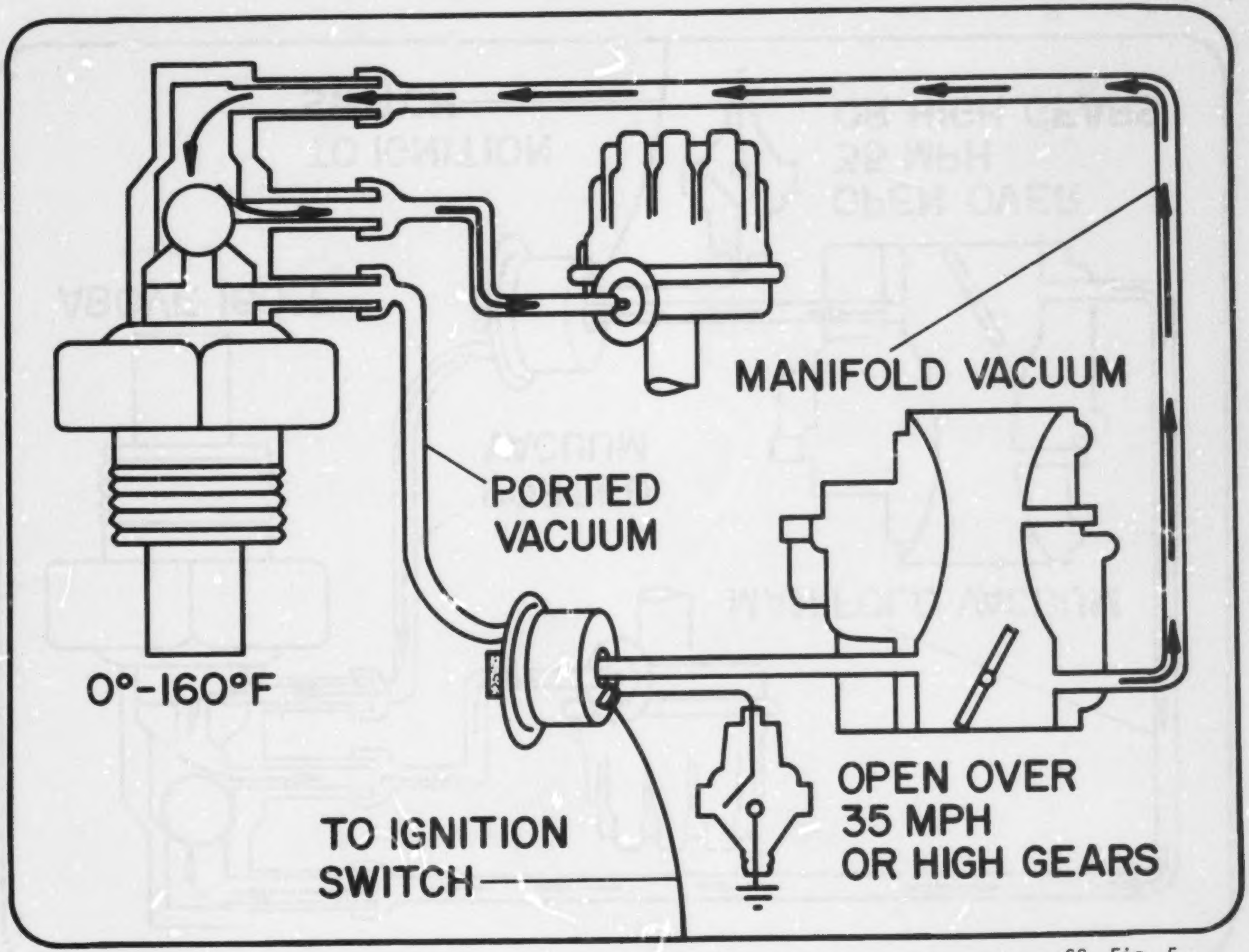
SC. Fig. 2


SOLENOID VACUUM SWITCH
DISTRIBUTOR
CARBURETOR
TRANSMISSION SWITCH
VACUUM ADVANCE UNIT
IGNITION

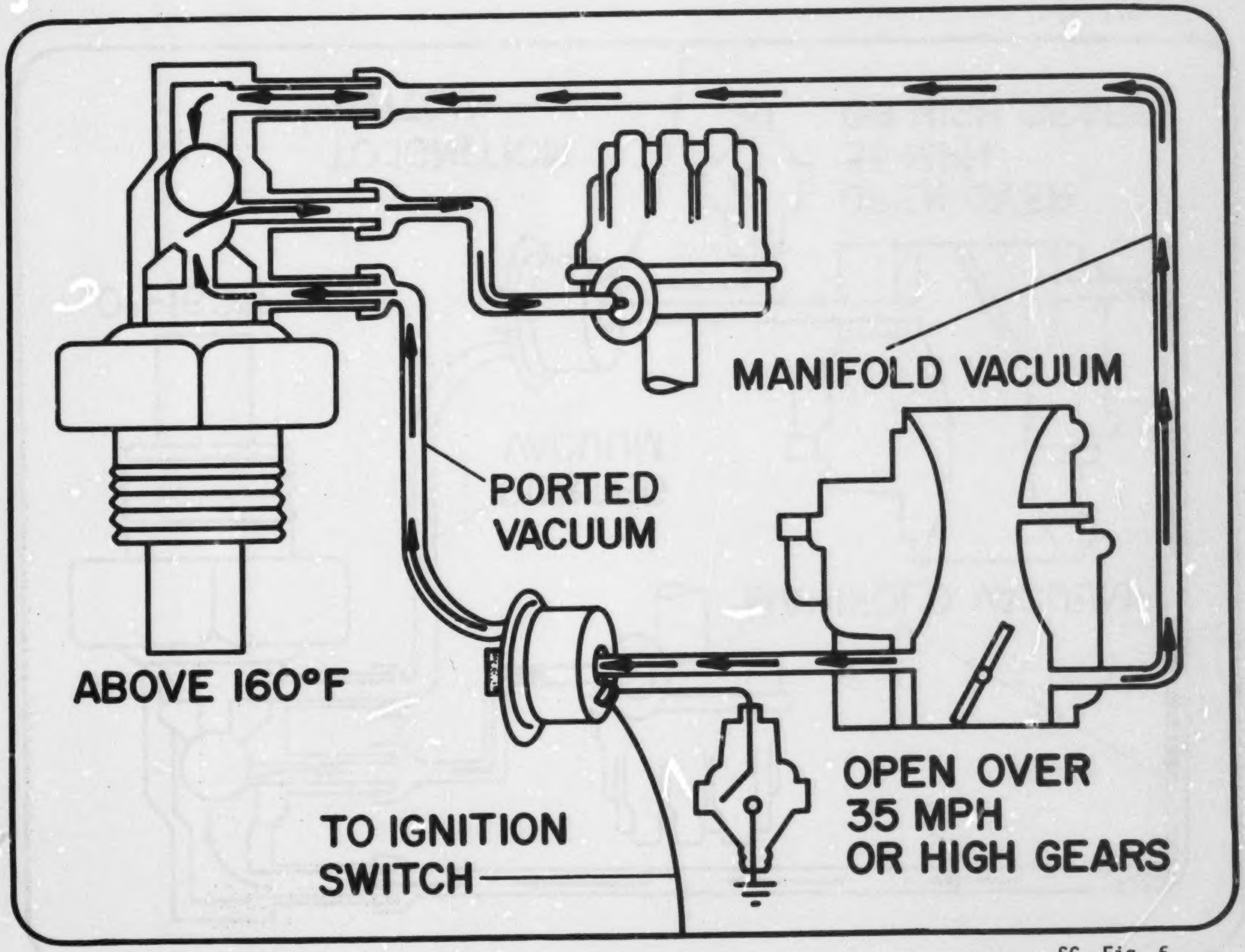
SC. Fig. 3


SOLENOID VACUUM SWITCH
DISTRIBUTOR
CARBURETOR
TRANSMISSION SWITCH
VACUUM ADVANCE UNIT
IGNITION

SC. Fig. 4

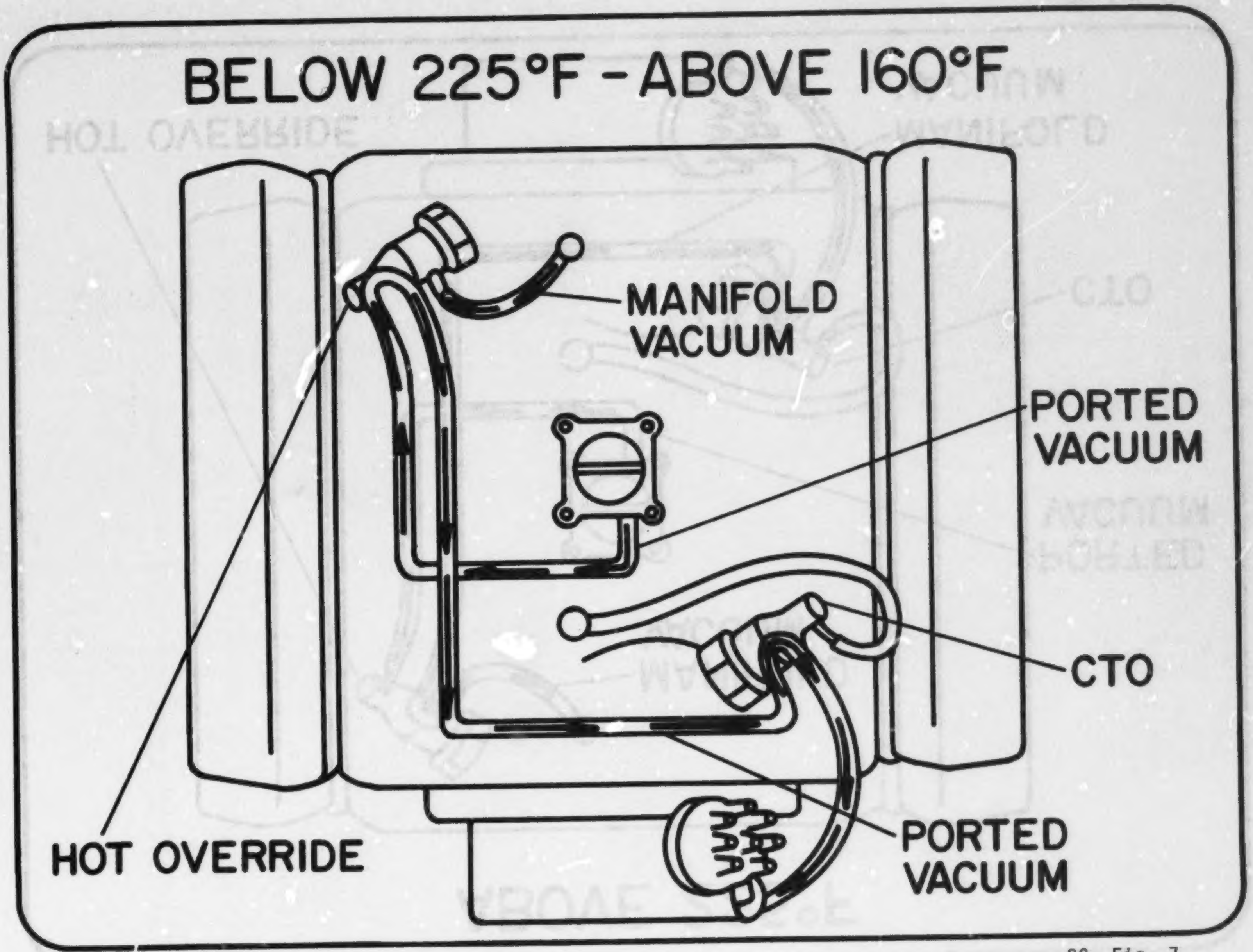

MANIFOLD VACUUM
PORTED VACUUM
0°-160°F
TO IGNITION SWITCH
OPEN OVER 35 MPH OR HIGH GEARS

SC. Fig. 5

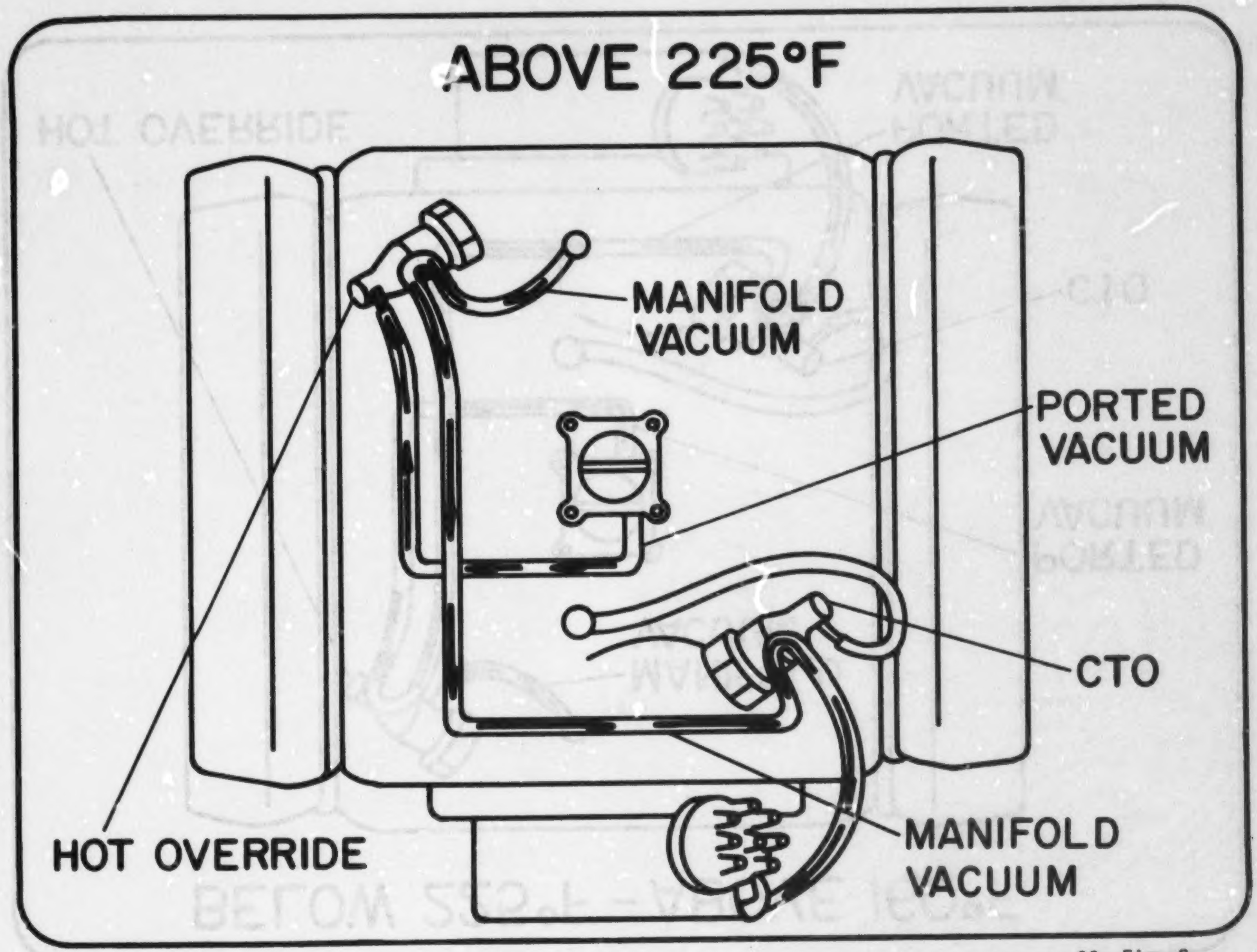

MANIFOLD VACUUM
PORTED VACUUM
ABOVE 160°F
TO IGNITION SWITCH
OPEN OVER 35 MPH OR HIGH GEARS

SC. Fig. 6

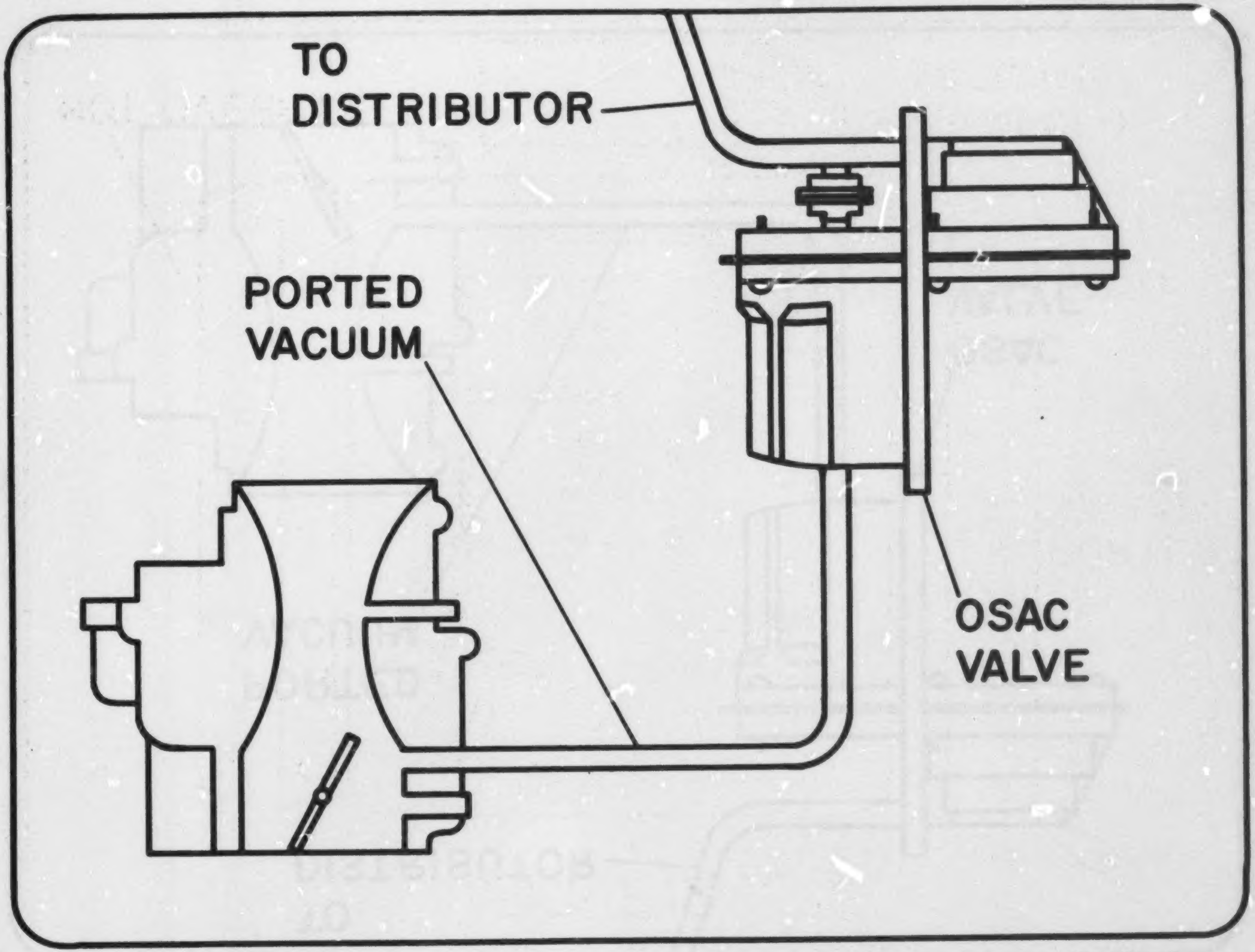
BELOW 225°F - ABOVE 160°F


MANIFOLD
VACUUM
PORTED
VACUUM
CTO
PORTED
VACUUM
HOT OVERRIDE

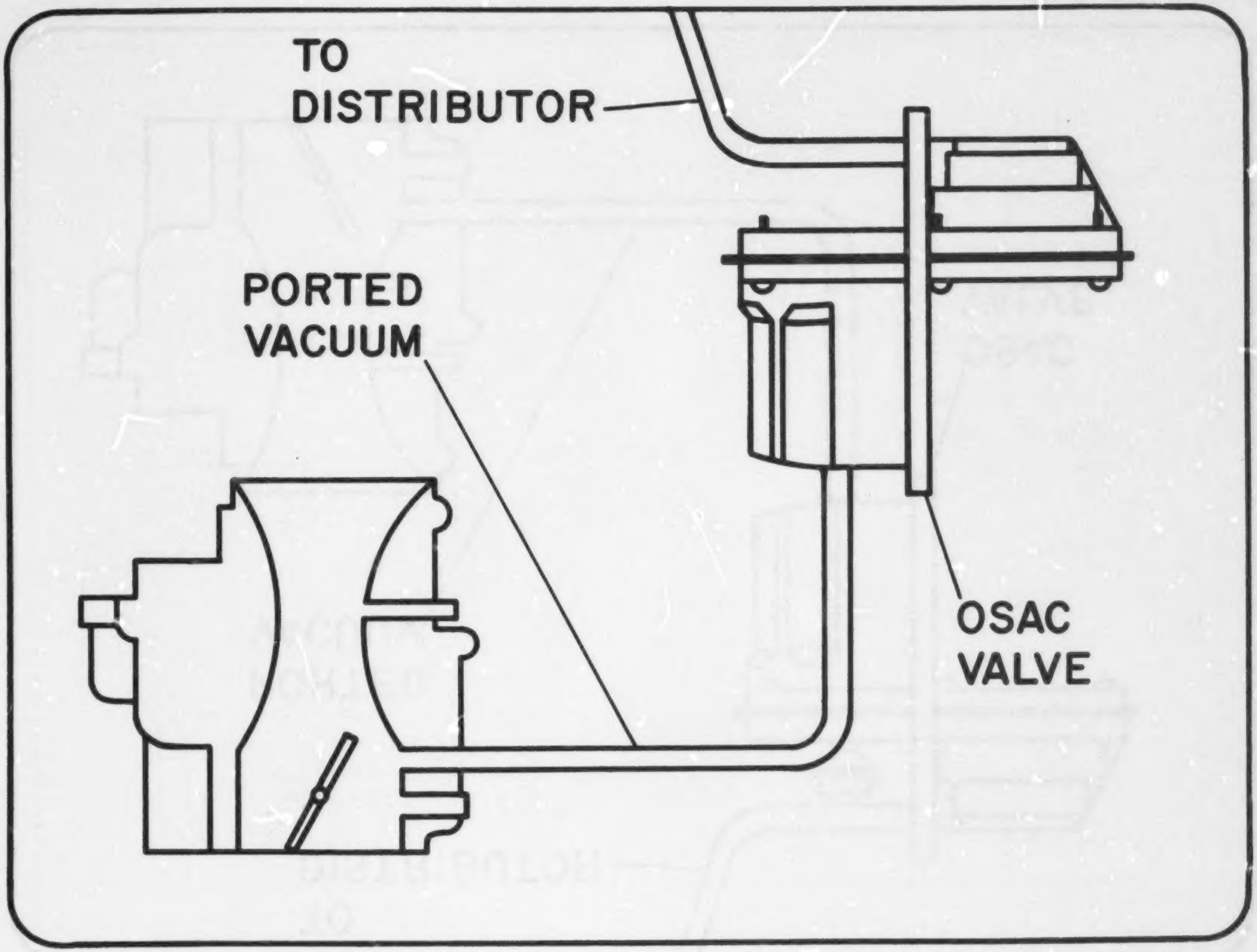
SC. Fig. 7


ABOVE 225°F
MANIFOLD VACUUM
PORTED VACUUM
CTO
MANIFOLD VACUUM
HOT OVERRIDE

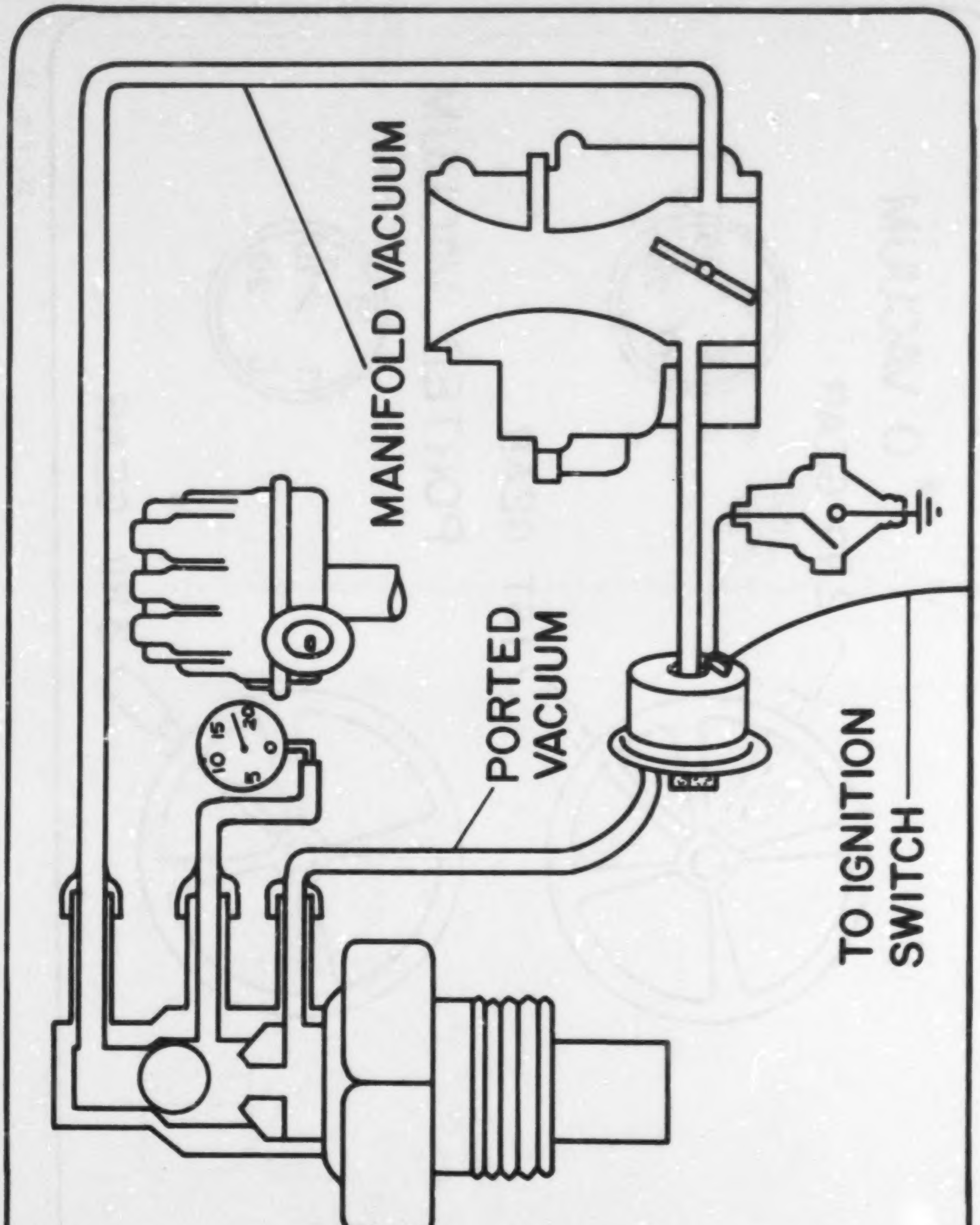
SC. Fig. 8


TO
DISTRIBUTOR
PORTED
VACUUM
OSAC
VALVE

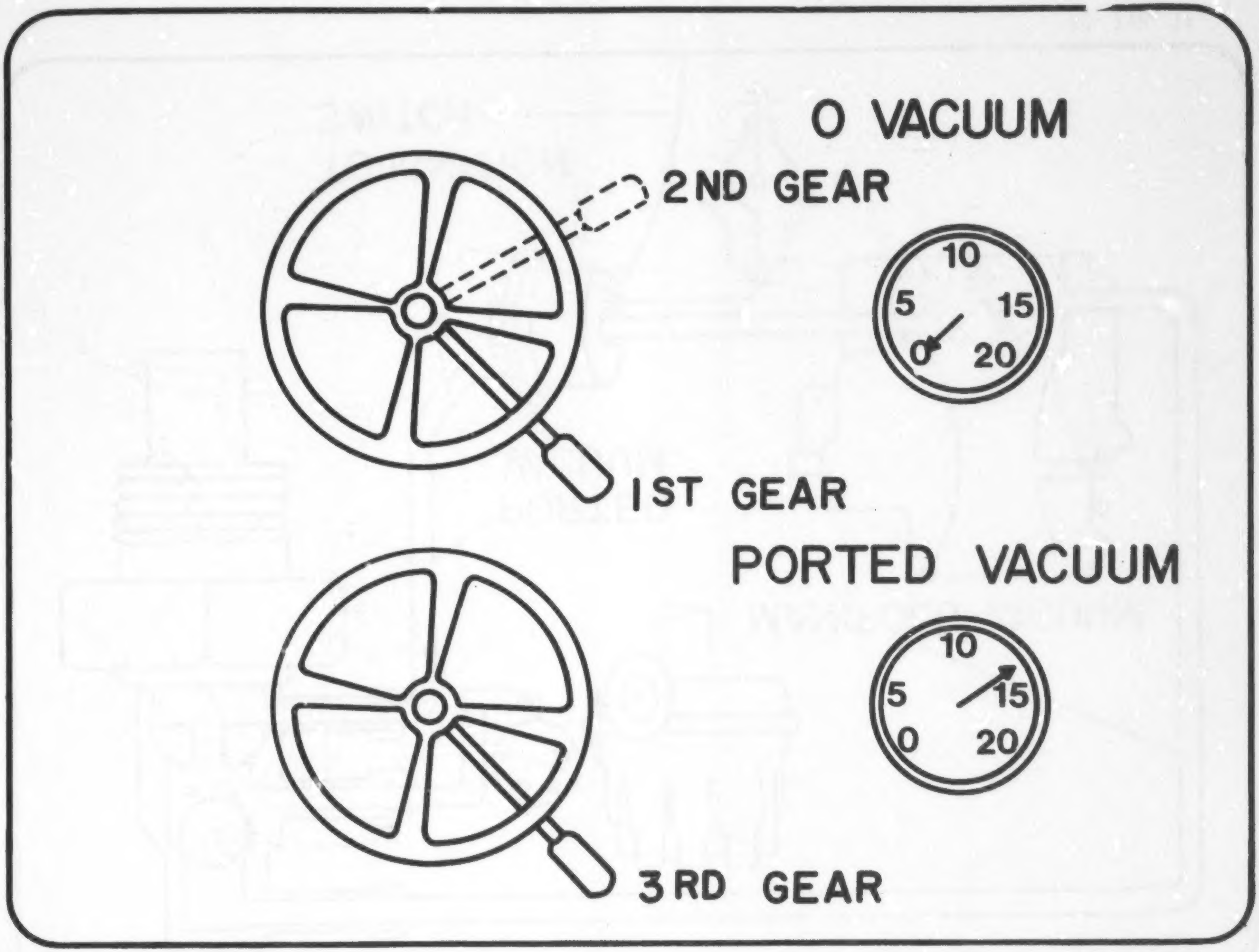
SC. Fig. 9


TO
DISTRIBUTOR
PORTED
VACUUM
OSAC
VALVE

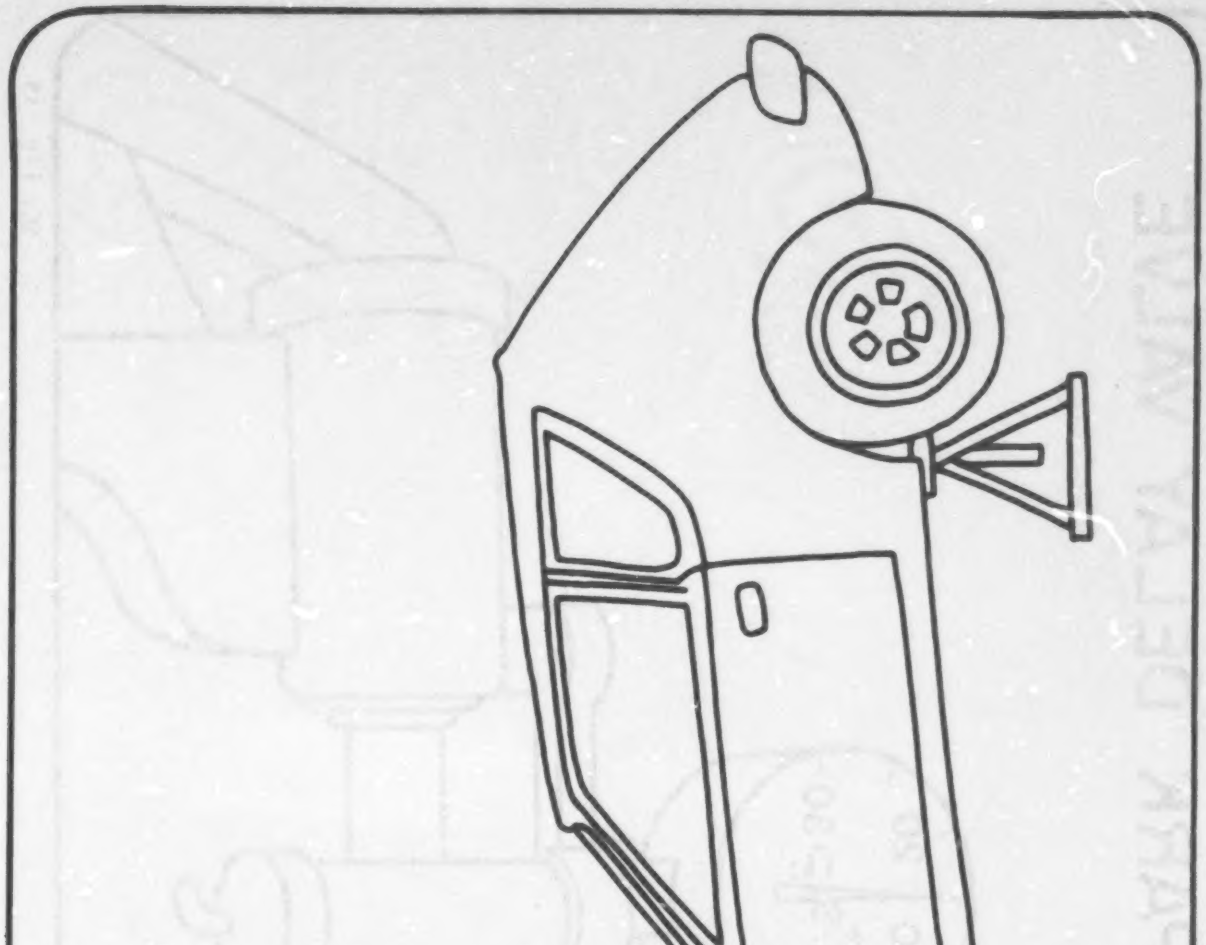
SC. Fig. 10


MANIFOLD VACUUM
PORTED VACUUM
TO IGNITION SWITCH

SC. Fig. 11

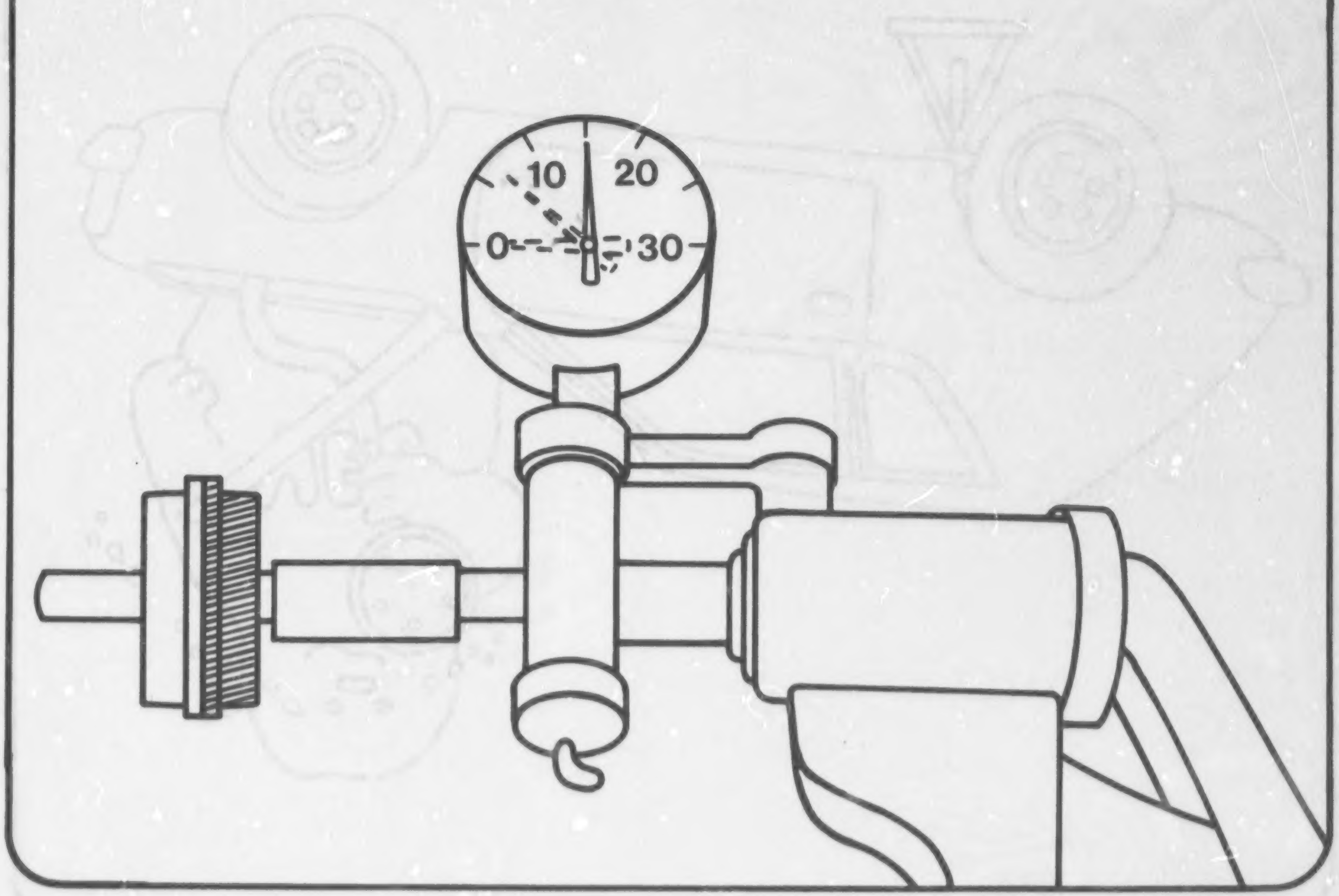

O VACUUM
2ND GEAR
1ST GEAR
PORTED VACUUM
3RD GEAR

SC. Fig. 12



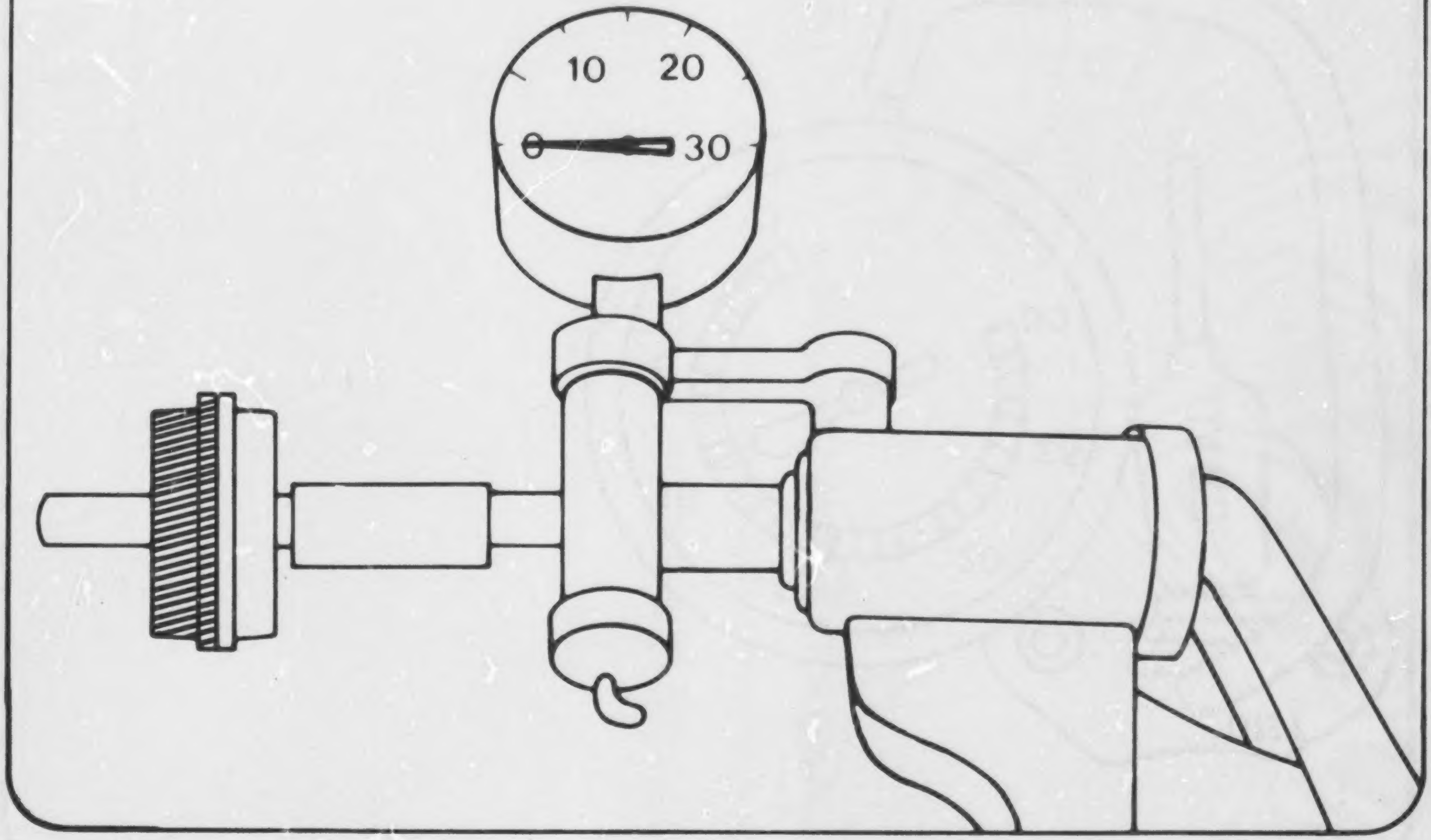
SC. Fig. 13

TESTING SPARK DELAY VALVE

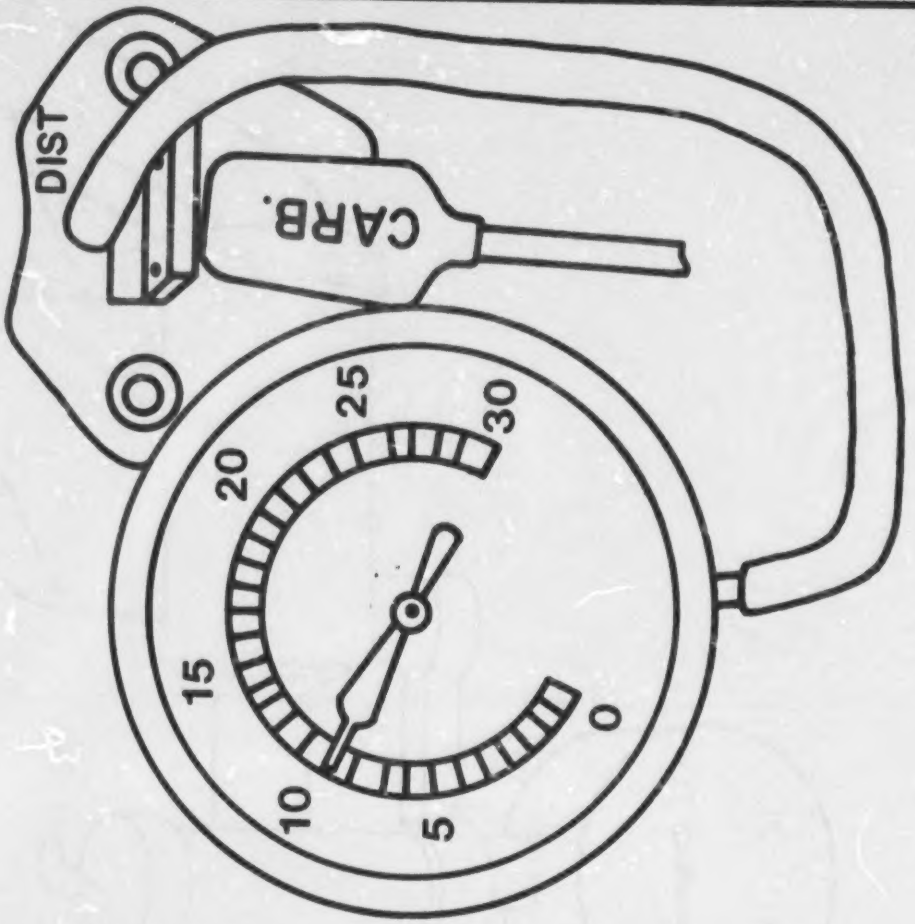


SC. Fig. 14

TESTING SPARK DELAY VALVE

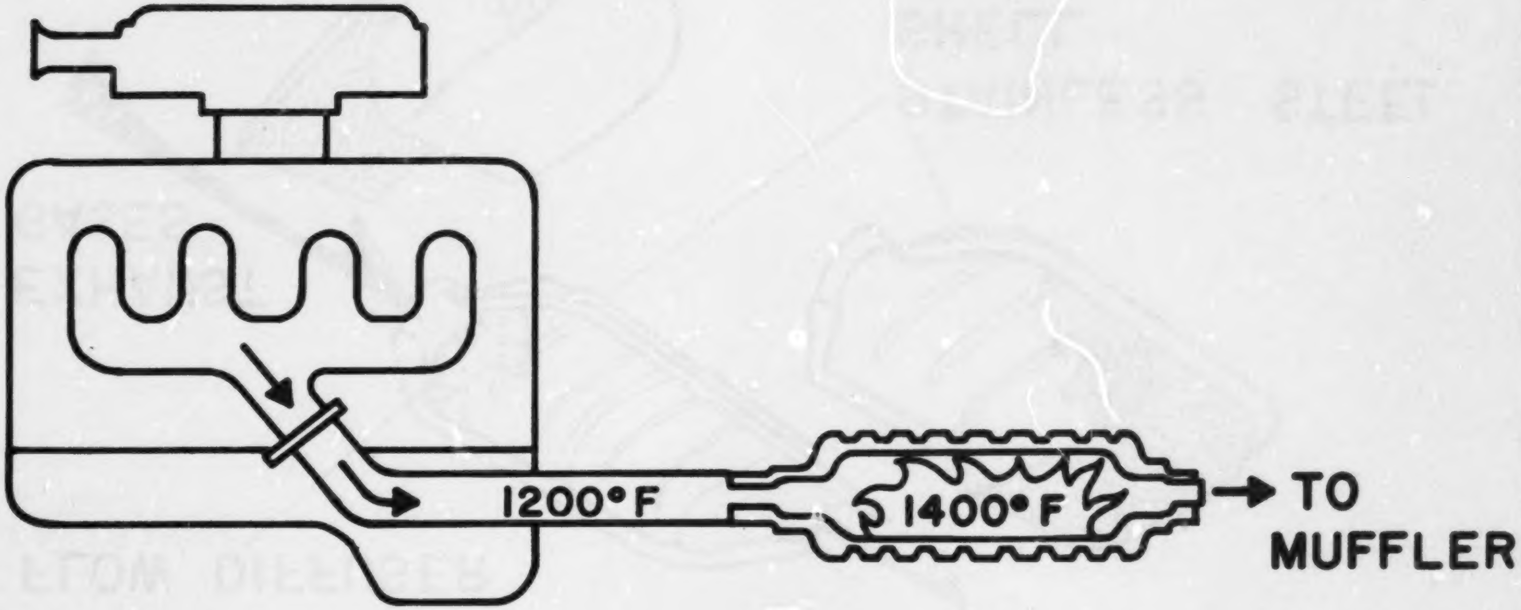


SC. Fig. 15


DIST
CARB.
0
5
10
15
20
25
30

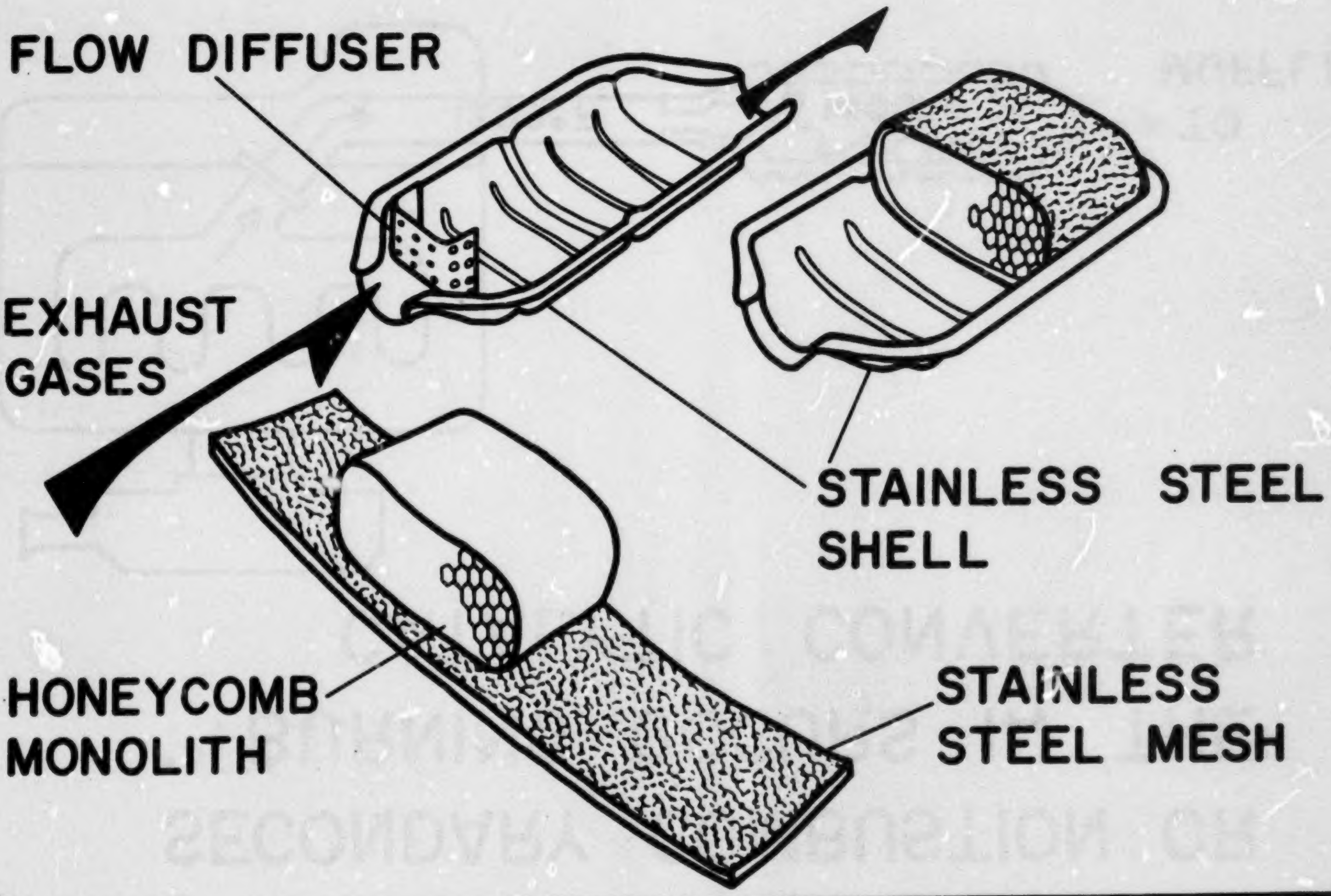
SC. Fig. 16

SECONDARY COMBUSTION OR BURNING OCCURS IN THE CATALYTIC CONVERTER


1200°F
1400°F
TO MUFFLER

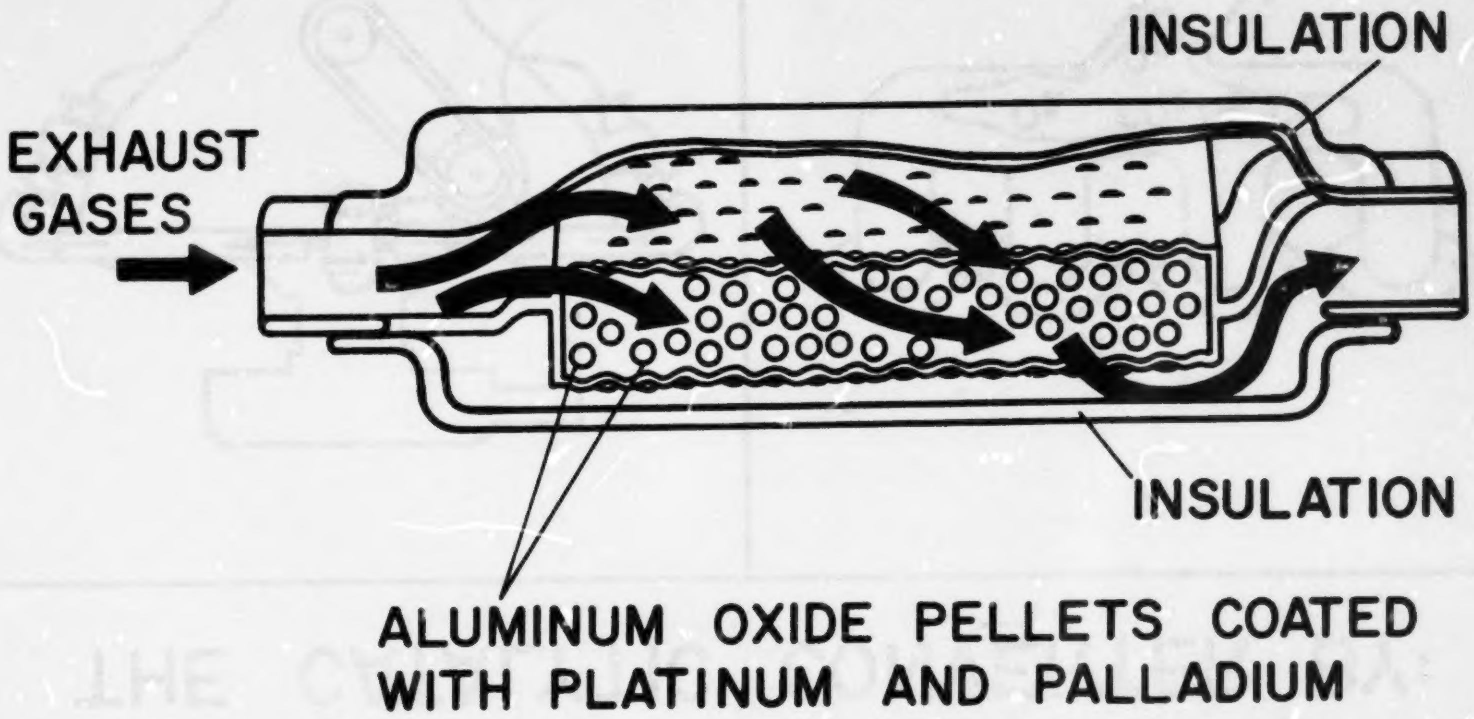
CAT. Fig. 1

MONOLITH CONVERTER


FLOW DIFFUSER
EXHAUST GASES
STAINLESS STEEL SHELL
HONEYCOMB MONOLITH
STAINLESS STEEL MESH

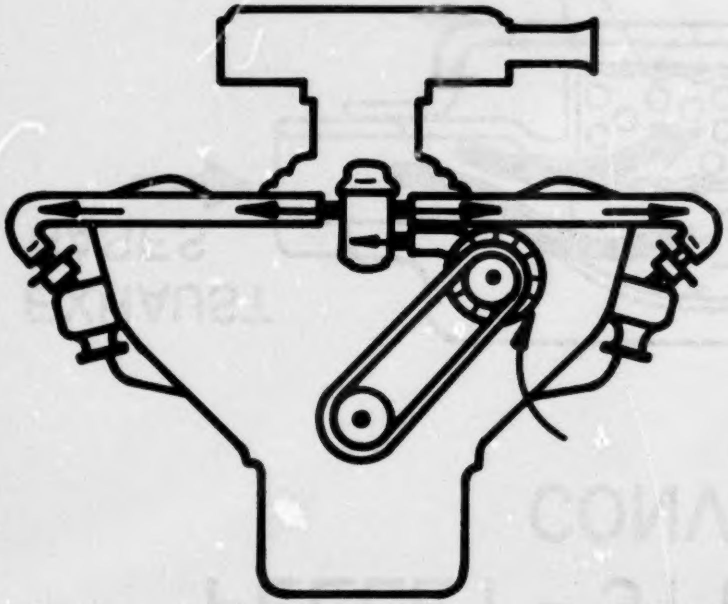
CAT. Fig. 2

EXHAUST GAS FLOW-THRU PELLET-STYLE CATALYTIC CONVERTER

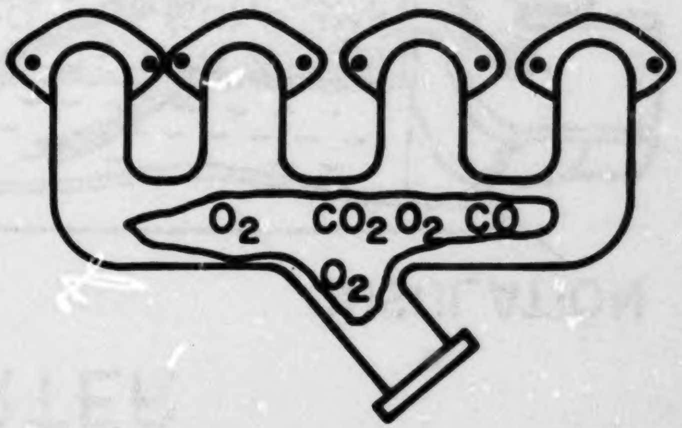

INSULATION
EXHAUST GASES
INSULATION
ALUMINUM OXIDE PELLETS COATED WITH PLATINUM AND PALLADIUM

CAT. Fig. 3

ADDITIONAL AIR IS SUPPLIED TO THE CATALYTIC CONVERTER BY:



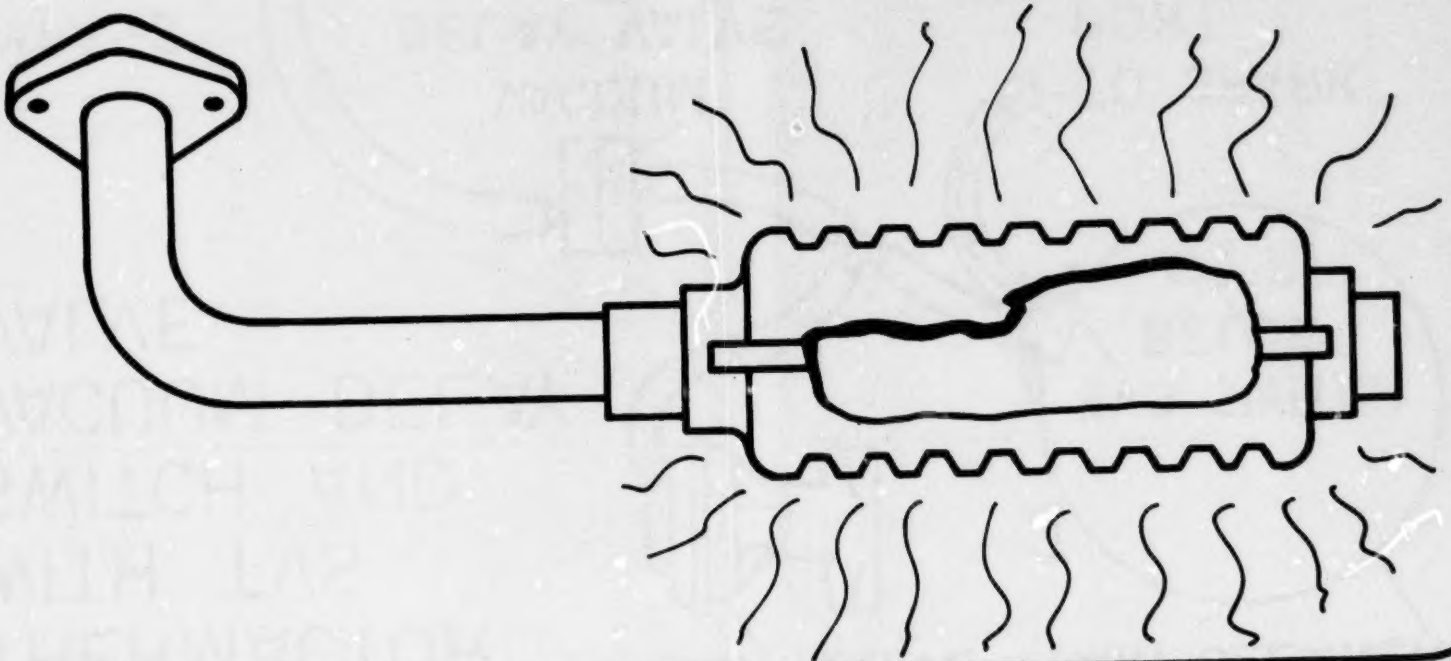
AIR INJECTION SYSTEMS


O_2
CO_2 O_2 CO
O_2

LEAN AIR-FUEL RATIOS

CAT. Fig. 4

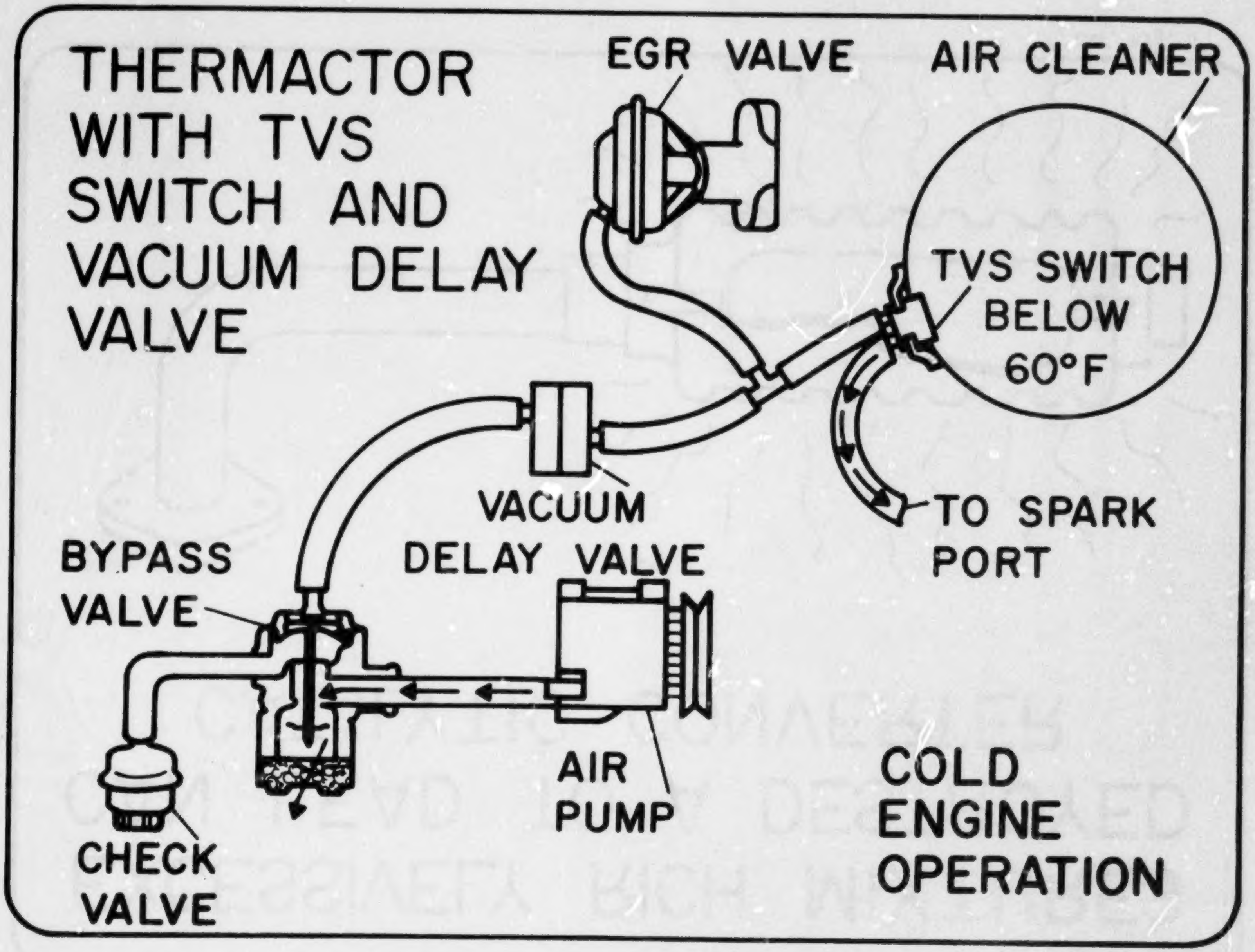
EXCESSIVELY RICH MIXTURES CAN LEAD TO A DESTROYED CATALYTIC CONVERTER



CAT. Fig. 5

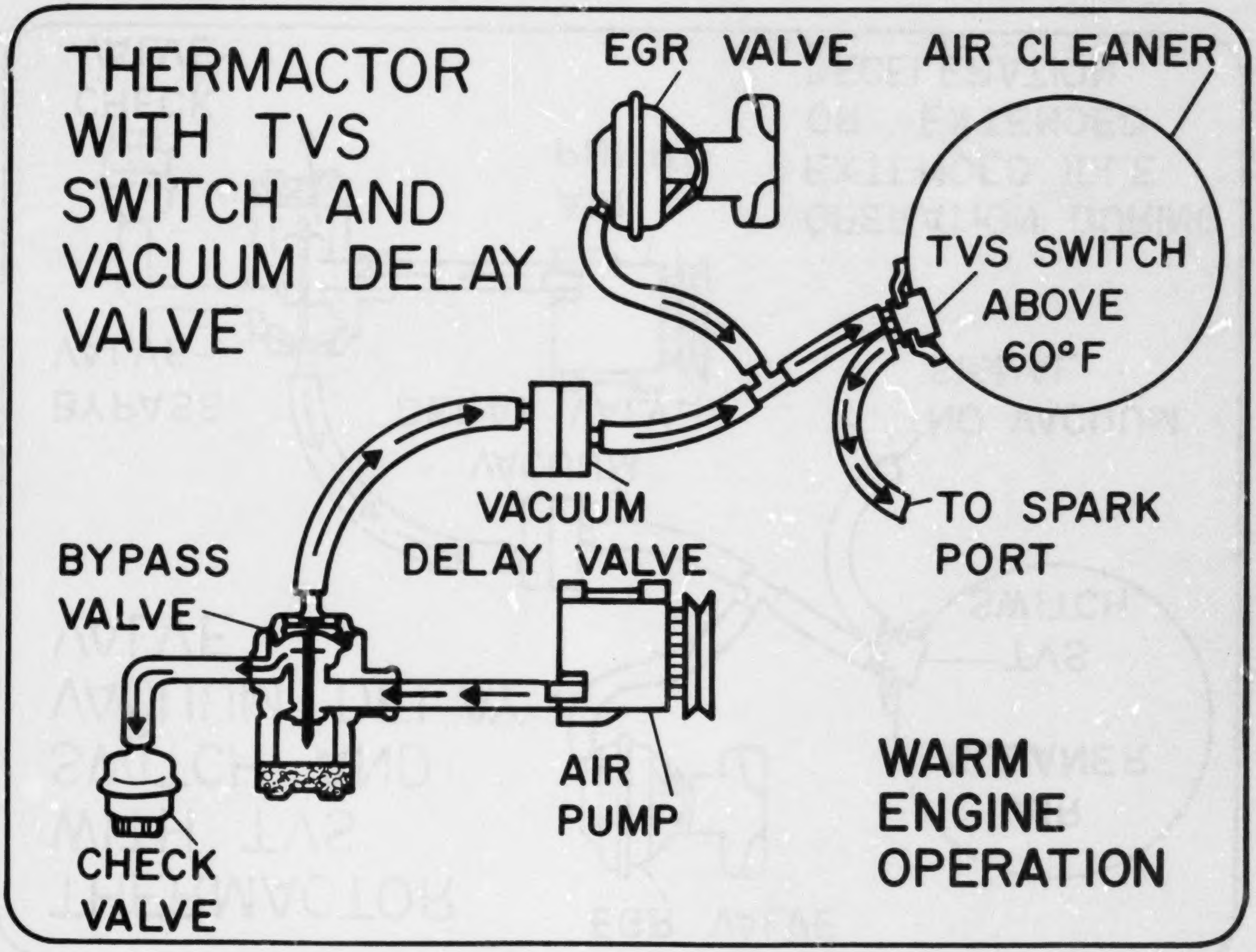
]

THERMACTOR WITH TVS SWITCH AND VACUUM DELAY VALVE


EGR VALVE
AIR CLEANER
TVS SWITCH BELOW 60°F
TO SPARK PORT
VACUUM DELAY VALVE
BYPASS VALVE
AIR PUMP
CHECK VALVE

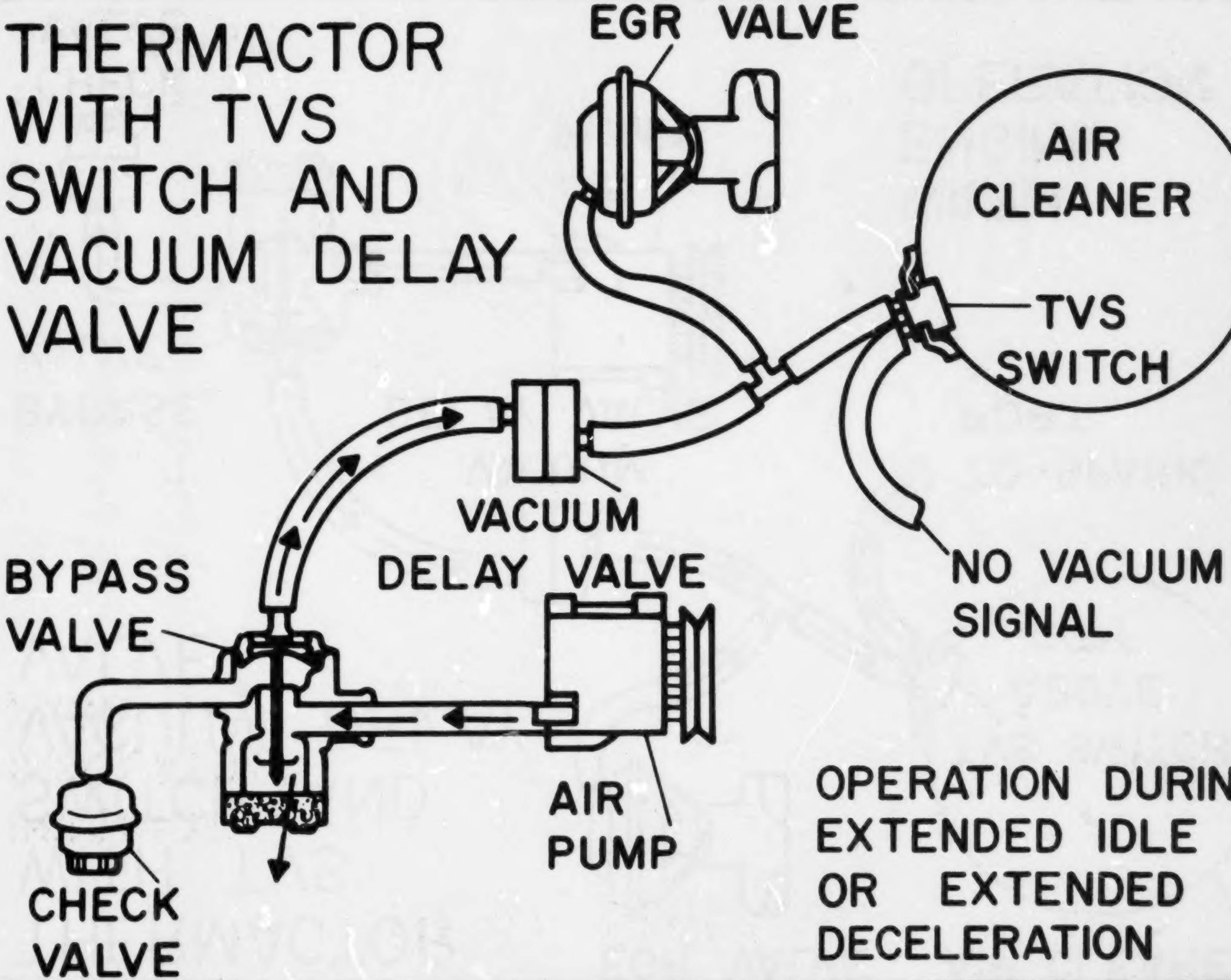
COLD ENGINE OPERATION

CAT. Fig. 6


THERMACTOR WITH TVS SWITCH AND VACUUM DELAY VALVE
EGR VALVE
AIR CLEANER
TVS SWITCH ABOVE 60°F
TO SPARK PORT
VACUUM DELAY VALVE
BYPASS VALVE
AIR PUMP
CHECK VALVE
WARM ENGINE OPERATION

CAT. Fig. 7

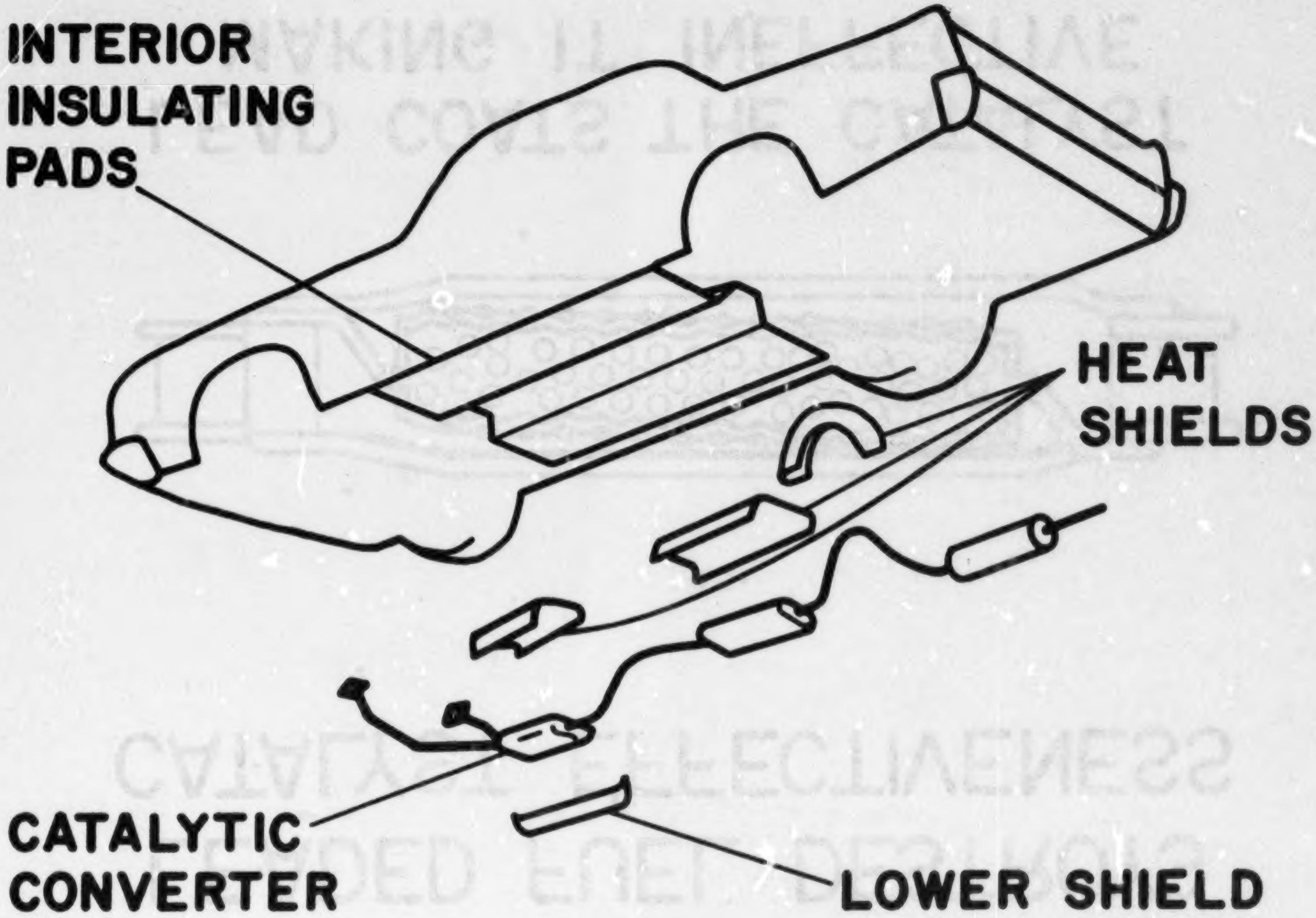
THERMACTOR WITH TVS SWITCH AND VACUUM DELAY VALVE


EGR VALVE
AIR CLEANER
TVS SWITCH
NO VACUUM SIGNAL
VACUUM DELAY VALVE
BYPASS VALVE
AIR PUMP
CHECK VALVE

OPERATION DURING EXTENDED IDLE OR EXTENDED DECELERATION

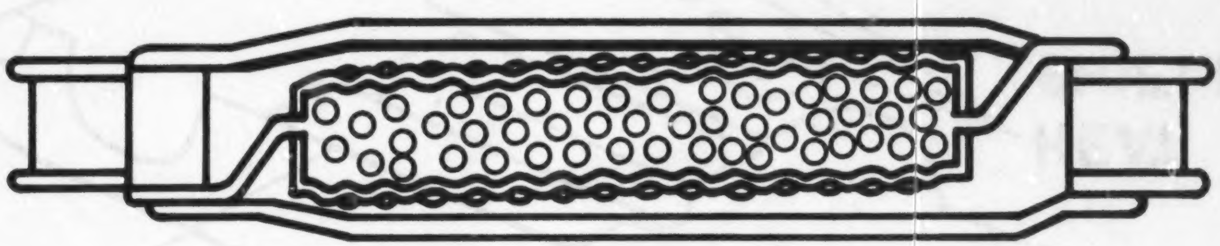
CAT. Fig. 8

HEAT SHIELDS


INTERIOR INSULATING PADS
HEAT SHIELDS
CATALYTIC CONVERTER
LOWER SHIELD

CAT. Fig. 9

LEADED FUEL DESTROYS
CATALYST EFFECTIVENESS



LEAD COATS THE CATALYST
MAKING IT INEFFECTIVE

CAT. Fig. 10

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